

Tactical Control System (TCS)
Formal Qualification Test
Test Procedures
Version 1.2
TCS 302



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SECTION 1 SCOPE

1.1 Identification

This TACTICAL CONTROL SYSTEM (TCS) - FORMAL QUALIFICATION TEST - TEST PROCEDURES VERSION 1.2 contains the test procedures to be executed during the formal testing of Engineering Build 3. These test procedures were developed with DI-IPSC-81439, dated 941205 as a guide. The formal test procedure will be updated and revised for Engineering Build 4. Execution redlines will also be incorporated in the test procedure developed for Engineering Build 4. Major deviations from the test procedure will be reported in the Test Report for Engineering Build 3. For hardware and software configuration items reference the Software Test Plan (STP) and the Version Description Document (VDD). The STP contains the formal testing purpose, formal test methodologies, and provides schedules for test activities.

1.2 Execution Site

All software tests are designed to be executed at the NSWCDD laboratory facility. The test procedures can be modified to be executed elsewhere. If there are any site changes, they will be recorded in the Test Summary Reports and in the Test Report for Engineering Build 3.

1.3 Execution Order

Table 1-1 lists the tests that will be executed for the evaluation of the Engineering Build 3 in priority order. The tests on top of the list will be executed first to ensure high priority functional coverage. The Initialization test procedure is the first test executed to benchmark all interfaces and program initialization. For every new load file generated during the formal testing phase, parts of the Initialization test procedure will be rerun before proceeding further with formal testing.

TABLE 1-1. Test Prioritization

Procedure Name	Pri	Execute Time
System Setup	N/A	N/A
Initialization	1	1
Telemetry	2	5
Payload Control	3	2
Payload Status	3	2
APL Antenna Control	3	2
Video Processing	3	2
C4I Tactical Messages	4	2
NITF Messages	4	2
ODCM Integration	5	2
PDCM Integration	5	2
RPP Integration	6	1
SAR Processing	7	1
Default State Data	8	1
Shutdown Processing	9	1
Endurance	10	24+
Total	16	50+

SECTION 2 FORMAL TEST PROCEDURES

2.0 General

Each test procedure contains three sections. The first is the purpose for the test procedure. This information comes from the Software Test Plan. The second is the requirement verified in the test procedure. A complete list of software requirements verified by these test procedures are in Appendix A cross-referenced by test procedure. The final part is the operator steps to execute the test procedure. The buttons and menu items actions have been bolded for easier identification.

2.1 System Setup

The purpose of the System Setup test procedure is to bring the TCS program to a standard operating state for the other test procedures. The System Setup test procedure will contain some test cases for software requirement verification. This test will be executed every time TCS needs to be started up. Most of the tests below have this test to be performed as one for the first steps.

Requirements: SRS0023, SRS0024, SRS0103

Steps:

Initialize ISD to an operational state of readiness.

1. Power on the simulation PC.
2. In Windows 95 double click on the AVSI Driver icon. Ensure ISD simulation comes up.
3. In the AVSI Driver window, select **AVSI** from the menu, from the list select **Setting....**
4. In the AVSI Settings window, set port to **5000**, then select the **OK** button.
5. In the AVSI Driver window, select **State** button. Ensure State goes to RUN from IDLE.
6. In the AVSI Driver window, select **AVSI** from the menu, from the list select **Window....** Ensure the AVSI Window is displayed. Use the Variables menu to add or remove variables.
7. In the AVSI Driver window, select **Simulation** from the menu, from the list select **Payload**. Ensure the Payload Window is displayed.
8. In the AVSI Driver window, select **Simulation** from the menu, from the list select **Vehicle**. Ensure the Vehicle Window is displayed.
9. At the ISD simulator, enter reasonable AV position, speed, altitude, heading, and payload depression and azimuth values for testing in the fields

At the Payload window:

Payload: Commanded _Azimuth = _____
Payload: Depression Command = _____

At the Vehicle window:

Vehicle: Airspeed Command = _____
Vehicle: Altitude Command = _____
Vehicle: Heading Command = _____
Vehicle: Latitude (deg) = _____

Vehicle: Longitude (deg) = _____

TCS login and startup.

10. Login as **tcs** and enter password. It will take about a minute for the DII/COE menu bar to be displayed [SRS0103-1].
11. From the DII/COE menu, select **TCS**, then select **TCS Main** from the pulldown menu. Ensure the connecting to the Data server window is displayed.
12. From the DII/COE menu, select TCS, then TCS Xterm Lower Screen.
13. From the DII/COE menu, select TCS, then TCS Xterm Lower Screen.
14. In one of the Xterm windows enter:

```
rlogin vmeux  
enter password
```

```
/h/TCS/bin/mds_cntl -s -R /h/TCS/data/mds_cntl.cfg
```

In the other Xterm window enter:

```
rlogin vmeux  
enter password
```

```
rlogin vmertb  
enter password
```

```
/h/TCS/bin/tcs_acm --ini tcs_acm.ini --no-daemon - Verbose
```

15. From the DII/COE menu, select **Chart**, then select **System Chart** from the pulldown menu (may not be needed if chart comes up automatically)
16. From the DII/COE menu, select **TCS**, then select **Route/Payload Planner** from the pulldown menu. Ensure the Route/Payload Planning window is displayed.
17. In the TCS window, select the desired mission from the list then press **Select**. Verify AV icon with heading indication and tail number is displayed on the map [SRS0023-1]. Note: for more than one AV start another AVSI program at the ISD and select another corresponding mission from the mission list.
18. Ensure a VCR is cabled and a tape is available.
19. Verify AV position displayed in the map window matches ISD sent data in lat/lon, [SRS0024-1] [SRS0024-4]. Lock ISD values for verification. Observe TCS values by right clicking on the AV icon and select **STATUS**. Record data below.

Position Data	ISD	TCS
Airspeed		
Altitude		
Position Lat/long		
Heading		
Pitch		
Roll		
Fuel Status		

20. Verify AV position displayed in the map window matches ISD sent data in MGRS, [SRS0024-3]. Lock ISD values for verification. Record data below.

Position Data	ISD	TCS
Airspeed		
Altitude		
Position MGRS		
Heading		
Pitch		
Roll		
Fuel Status		

21. Verify AV position displayed in the map window matches ISD sent data in UTM, [SRS0024-2]. Lock ISD values for verification. Record data below.

Position Data	ISD	TCS
Airspeed		
Altitude		
Position UTM		
Heading		
Pitch		
Roll		
Fuel Status		

22. At the ISD console, unlock ISD values.

2.2 Initialization

The purpose of the Initialization test procedure is to ensure that all operator entry and display windows are displayable, that required interfaces can be established, and that required processing exists in the CM build. The test is used to determine if the delivered software build is ready for FQT. The Initialization test procedure is the first test executed. For every new load file generated during the FQT Phase, parts of the Initialization test procedure will be rerun before proceeding further with formal testing.

Requirements: Not Applicable

Steps:

1. Perform the TCS System setup procedure.
2. Ensure Icon on the map and display data is updating.
3. Power up the VCRs, load the tapes and push play.
4. At the TCS toolbar, select **Video**, then select **Output # 1...** from the pull-down menu. Ensure video is displayed in window 1.
5. At the TCS toolbar, select **Video**, then select **Output # 2...** from the pull-down menu. Ensure video is displayed in window 2.
6. Ensure the data in the status displays update. (Video Display, AV status display, Center Field of View, etc.)
7. At the video window, select **File**, then **Capture NITF**, from the pull-down menu. View the resulting image via the Graphics utility.
8. Select the Capture icon from the toolbar. View the resulting image via the DII/COE **Intel**.
9. On DII, left-click on **Intel** pull down menu, and left-click on **Image Composition Tool v2.3**. The **Image Composition** window appears.
10. Load the file to view. Left-click on **File**, and then left-click on **Load (File System)**. The **File Selection** window appears. Select the directory. Move from **/h/data/local/NITFS/tmp/** to **/h/TCS/data/video_frames/**.
11. Using the scroll bar, look for the last file that contains the NITF extension. Select it, and **OK**.
12. The Captured image must appear on **Image Composition** window. Ensure that the capture image is the same as the on the video monitor.
13. Check the Telemetry data. On the **IMAGE COMPOSITION TOOL V2.3**, left click on **EDIT**. The **Text Header** window opens.
14. ON the **File Selection** window, select the file with the extension **txt**, and press **OK**.
15. Close the **Telemetry Data** window. On the Telemetry data window, press **OK**.
16. On the **Image Composition Tool V2.3**, press **OK**. Ensure that the NITF image display is removed from the screen.

17. Ensure the transmission of NITF messages using NFS to PTW. Use the PTW procedure to power up and display the NITF image. (ref SRS0033)

Upload a route and payload plan.

18. Ensure a Route/Payload Plan can be created and flown. If an existing plan is used record the name_____. If an existing plan does not exist, create a plan using the steps below.
19. From the **File** menu, choose **new route**.
20. Choose a location for the launch point (left mouse click desired point).
21. Choose a location for the landing point (left mouse click desired point). Edit Route/Payload plan parameters dialog window is displayed.
22. Modify values on the Route/Payload plan parameters window if desired and select **OK**. Route launch/landing points are displayed with a dashed line connecting them.
23. Position the pointer on the launch point and click the left button to designate the reference point (existing point after which the inserted point will occur).
24. Select **Insert Point** option from the **Edit** menu, or the Insert Point hot button.
25. Press the left mouse button.
26. Move pointer to the desired location on the map and click any mouse button to insert the point.
27. Repeat the previous two steps to insert another point(s).
28. Position the mouse pointer on the (active) Main Window and press the **Escape** key to exit insert point mode.
29. Left mouse click on the launch point to designate the segments initial point.
30. Shift and left mouse click on the landing point to designate the segments final point.
31. Select **Router** from the pull-down menu, select **route**, select **Flight Simulation** routing.
32. Select Router from the pull-down menu, select FVR.
33. Verify the routing has been completed.
34. Fine tune the route as needed, until a uploadable plan results.
35. Send the Route/Payload Planner file to the DCM; Select **Upload Route to UAV** function from the Tools pull down menu. A successful upload will display the Validity Check Status display window, informing the user that the Route/Payload plan has been uploaded.

Ensure the capturing of target data and sending RECCEXREP messages.

36. At the ISD, ensure field values for Latitude, Longitude, and GPS_Time_Sec are changing.
37. Select **Comms**, then **Tac Msg...** from the TCS Main window. Click on the **RECCEXREP** tab to select the RECCEXREP tactical message.

38. In the RECCEXREP window enter the name, supp, email destination (tcs).
39. Bring up the TDBM menu by selecting **COMMS** then **TDBM** from the pulldown menu. Enter country code, Org type, echelon, heading, speed, Short name, Long name. Record entries in the following table:

TDBM field	Value Entered
Track type	
Class	
Country Code	
Org type	
Echelon	
Pos	
Time	
HDG	
SPD	
Alert Code	
Short name	
Long name	

40. Click on a point of interest in the video window to transfer coordinates to the TDBM window.
41. Select **apply** in the TDBM window and verify the track/target is transferred to the list in the RECCEXREP window. Verify a corresponding target icon is displayed on the Charts display.
42. Select SEND in the RECCEXREP window. Verify target/track is cleared from the list in the RECCEXREP window.
43. Ensure the contents of the message in the email program.

Ensure SAR interface processing.

44. Open a xterm window from the tool bar to start to the SAR Processor by selecting **TCS**, **TCS Xterm** from the DII/COE pulldown menu.
45. Ensure that the SAR Processor system is up and operational.
46. In the xterm window, change to the startup script directory and enter
setenv TCS_HOME /h/TCS
47. In the xterm window, run startup script for the SAR Processor by entering **startup**.

48. In the _____ ?? _____ window, select the host name for Xwindows to give SAR display permissions, then depress the **SELECT** button.
49. In the startup_t window, depress the **START XFER** button.
50. In the startup_t window, depress the **START DISPLAY** button. Ensure TCS can launch the SAR Processor program and verify display the SAR imagery in waterfall mode.
51. Terminate display the SAR imagery in waterfall mode. In the SAR menus, select **Quit**, then in the QuitAppConfirm_popup window, select **Yes**.
52. Close the terminal window.

Payload Control.

53. Ensure EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by selecting **CNTR**, then clicking in the video window. At the ISD verify EOIR_Pointer_Latitude, EOIR_Pointer_Longitude, EOIR_Pointer_Altitude elements of the EOIR Command Message are set to the cursors' coordinates.

Cursor Coordinates (selected at the Video window)	Coordinates at the ISD

54. Verify TCS provides the capability to switch the AV's EOIR_PAYLOADS_ON/OFF (EOIR_Payload_Active). Select the following payloads at the video window and verify the selection at the ISD.

Payload selected at TCS	Payload type in AVSI IDD	EOIR Command Message EOIR_Payload_Active	Value if different	Notes:
Off	None	0		
EO-Spot	Spotter	1		
EO-Wide	Wide Angle	2		N/A for outrider
IR	IR	3		

2.3 Video Processing

The purpose of the Video Processing test procedure is to ensure that the National Television System Committee (NTSC) video is viewable on the TCS workstation. The procedure will ensure that overlay data can be displayed, that closed caption data can be appended to the received NTSC video, and that the TCS can transmit video to C4I systems.

Requirements: SRS0008, SRS0009, SRS0012, SRS0013, SRS0014, SRS0016, SRS0018, SRS0020, SRS0062, SRS0063, SRS0064, SRS0065, SRS0066, SRS0068

Steps:

1. Perform System Setup Procedure.
2. Ensure the TCS is cabled to an RS-170 video monitor. (This will represent the interface to CCTV, JSTARS-CGS and JMCIS.)
3. Power up the RS-170 video monitor. The monitor display is black.
4. Power up the VCR, load tape and push **Play**.
5. Verify RS-170 NTSC video is transmitted and displayed without overlay on the monitor [SRS0016-1][SRS0018-1][SRS0020-1].
6. Turn on **Output1** image video display. On **TCS Main**, left-click on **Output1** short cut button.
7. Change the Antenna Position. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Datalink Position** window appears. Change the fields as described below:

Datalink Position	
Field	Value
ANT_Altitude	0.0
ANT_Latitude	0.0
ANT_Longitude	0.0
ANT_Magnetic_Variation	0.0
ANT_Platform_Heading	0.0

8. On ISD, right-click on the fields specified on table, and set them to the specified values. Verify that the Image Coordinates, and angles data, and overlays appear on Output1 as shown on table [SRS0012-1] [SRS0012-2]:

Payload Status Message					
ISD Field Title	ISD Values	TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
AV_Altitude	10000	Center FOV Slant Range	10436		
AV_Lat	0	Center FOV Lat	00:00:17.86		
AV_Lon	0	Center FOV Lon	00:00:23.36		
AV_Heading	0	LOS Incidence Angle	73:22:46.97		
AV_Pitch	0	LOS True Azimuth Angle	052:35:55.58		
AV_Roll	-13.333				
PL_Azimuth	0				
PL_Depression_angle	80				
PL_FOV_Horizontal	26.333				

Payload Status Message					
ISD Field Title	ISD Values	TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
PL_FOV_Vertical					

9. Move cursor to the corners as illustrated below, and verify that the coordinates displayed match those on the table [SRS0012-1] [SRS0012-2]:

Four Corners Table				
Corner	Latitude	P/F	Longitude	P/F
ULC	00:00:35.32		-00:00:01.46	
URC	00:00:39.82		00:00:51.35	
LLC	-00:00:00.47		-00:00:00.26	
LRC	-00:00:00.52		00:00:49.51	

10. Remove Video. Press **Stop** on the VCR and power it off (no video display).
11. Verify no change in any other display feature [SRS0008-2].
12. On ISD, set the fields to the specified values. Verify that the Image Coordinates, and angles data, and overlays appear on Output1 as shown on table [SRS0012-1] [SRS0012-2]:

Payload Status Message					
ISD Field Title	ISD Values	TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
AV_Altitude	50000	Center FOV Slant Range	51200.0		
AV_Lat	15	Center FOV Lat	14:59:21.71		
AV_Lon	90	Center FOV Lon	90:01:46.11		
AV_Heading	130	LOS Incidence Angle	77:27:13.57		
AV_Pitch	10	LOS True Azimuth Angle	110:29:16.27		
AV_Roll	5				
PL_Azimuth	25				
PL_Depression_angle	88				
PL_FOV_Horizontal	5				
PL_FOV_Vertical	6.667				

13. Turn off **Output1** window. On TCS Main, left-click on the **Output1** button. Observe if there is no image displayed [SRS0063-1].
14. Turn on **Output1** window. On TCS Main, left-click on the **Output1** button. Observe if the image is displayed on **Output1** window overlay [SRS0014-2].
15. Move cursor to the corners as illustrated below, and verify that the coordinates displayed match those on the table [SRS0012-1] [SRS0012-2]:

Four Corners Table				
Corner	Latitude	P/F	Longitude	P/F
ULC	14:59:15.87		90:02:15.06	
URC	14:58:57.40		90:01:32.71	
LLC	14:59:46.10		90:01:59.54	
LRC	14:59:27.42		90:01:17.84	

16. Turn on the image. Power On the VCR, and press Play. Verify the image appear on Output1 [SRS0008-1]. Observe the if the overlay and video data has not changed from the previous values [SRS0014-2] [SRS0013-2]:

TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
Center FOV Slant Range	51200.0		
Center FOV Lat	14:59:21.71		
Center FOV Lon	90:01:46.11		
LOS Incidence Angle	77:27:13.57		
LOS True Azimuth Angle	110:29:16.27		

17. Turn image off. Press Stop on the VCR and the power it off. Observe if there is no image on Output1. Observe if the overlay and video data has not changed from the previous values:

TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
Center FOV Slant Range	51200.0		
Center FOV Lat	14:59:21.71		
Center FOV Lon	90:01:46.11		
LOS Incidence Angle	77:27:13.57		
LOS True Azimuth Angle	110:29:16.27		

18. Turn overlay off. In Output1 window, left-click the pull down menu **Set Up**, left-click on **Overlay** (no overlay).
19. Turn image on without overlay. Power VCR On, and press **Play**. Observe image on Output1 display without any overlay [SRS0014-1].
20. Turn **Overlay** on with image on. In Output1 window, left-click pull down menu **Set Up**, left-click on **Overlay**.
21. Observe if the overlay and video data has not changed from the previous values [SRS0013-1] [SRS0013-2].

TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
Center FOV Slant Range	51200.0		
Center FOV Lat	14:59:21.71		
Center FOV Lon	90:01:46.11		
LOS Incidence Angle	77:27:13.57		
LOS True Azimuth Angle	110:29:16.27		

22. Turn Overlay off. In Output1 window, left-click pull down menu **Set Up**, left-click on **Overlay**.
23. On Output1 display window, observe video without overly [SRS0064-1].
24. Turn image off. On VCR, press **Stop**, then power off the VCR.
25. Turn off Output1 window. On TCS Main, left-click on the Output1 button. Observe if there is no image displayed [SRS0063-2].
26. Turn on Output1 window. On TCS Main, left-click on the Output1 button. Observe if the image is displayed on Output1 window with out overlay [SRS0014-2].

27. Turn **Overlay** on. In Output1 display window, left-click pull down menu **Set Up**, left-click on **Overlay**.
28. Remove **Telemetry Data** from the video window. On **Video #1** window, left-click on the pull down menu **Tools**, and select **Display Data**. Verify that the **Telemetry Data** is removed from **Video #1** window [SRS0065-1] [SRS0066-1].
29. Incorporate **Telemetry Data** to the video window. On **Video #1** window, left-click on the pull down menu **Tools**, and select **Display Data**. Verify that the **Telemetry Data** is incorporated to the **Video #1** window [SRS0065-2].
30. Change the Antenna Position. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Datalink Position** window appears. . The **Datalink Position** window appears. Change the fields as described below:

Datalink Position	
Field	Value
ANT_Altitude	1000.0
ANT_Latitude	0.0
ANT_Longitude	0.0
ANT_Magnetic_Variation	0.0
ANT_Platform_Heading	0.0

31. Verify that the image Coordinates, and angles data, and overlays are recalculated as shown on table [SRS0012-4]:

Payload Status Message					
ISD Field Title	ISD Values	TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
AV_Altitude	2222.22	Center FOV Slant Range	1233.0		
AV_Lat	43	Center FOV Lat	43:00:00.0394		
AV_Lon	77	Center FOV Lon	77:00:02.1940		
AV_Heading	60	LOS Incidence Angle	82:24:37.9362		
AV_Pitch	15	LOS True Azimuth Angle	88:35:37.8394		
AV_Roll	20				
PL_Azimuth	110				
PL_Depression_angle	65				
PL_FOV_Horizontal	10				
PL_FOV_Vertical	6.667				

32. Move cursor to the corners as illustrated below, and verify that the coordinates displayed match those on the table [SRS0012-4]:

Four Corners Table				
Corner	Latitude	P/F	Longitude	P/F
ULC	42:59:59.4504		77:00:03.8689	
URC	42:59:59.0607		77:00:00.9736	
LLC	43:00:01.0379		77:00:03.4391	
LRC	43:00:00.6133		77:00:00.5620	

33. Change the Antenna Position. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Datalink Position** window appears. Change the fields as described below:

Datalink Position	
Field	Value
ANT_Altitude	0.0
ANT_Latitude	0.0
ANT_Longitude	0.0
ANT_Magnetic_Variation	0.0
ANT_Platform_Heading	0.0

34. Change ISD values.

Payload Status Message	
ISD Field Title	ISD Values
PL_Active_Sensor	2
PL_Focal_Lenth_Command	2500
PL_Depression_angle_Command	60
AV_Tail_Number	XYZ456
GPS_Week	0.0
GPS_Second	0.0
AV_Altitude	1000
AV_Lat	45
AV_Lon	90
AV_Heading	0.0
AV_Pitch	15
AV_Roll	20
PL_Azimuth	40
PL_Depression	55
PL_FOV_Horizontal	25
PL_FOV_Vertical	18.75

35. Verify that the following data is updated on the Output1 window display [SRS0065-9] [SRS0009-1] [SRS0065-3]:

Payload Status Message			
Output1 Field	Output1 Expected Value	Output1 Value if different from expected	P/F
Time	0:0:0		
Date	Jan 6, 1980		
PL_Active_Sensor	2 (FLIR)		
PL_Focal_Lenth	2500		
PL_Depression	55		
AV_Tail_Number	XYZ456		
CFOV Lat	45:00:08.61		
CFOV Lon	90:00:01.23		

36. On System Chart, Select **Map Options**, then **Whole World**, and locate the AV symbol on the map. Zoom on it until footprint display is visible. Verify the footprint appears on display [SRS0068-1].

37. Freeze ISD. On ISD WINDOW, press **State**.
38. Change ISD frequencies to one message every 10 sec (0.01HZ). On ISD, change the fields as follows:

ISD Field Title	ISD Values
Interface: AESM Frequency	0.1
Interface: AFSM Frequency	0.1
Interface: AISIM Frequency	0.1
Interface: APSM Frequency	0.1
AV_Altitude	2222.22
AV_Lat	43
AV_Lon	77
AV_Heading	60
AV_Pitch	15
AV_Roll	20
PL_Azimuth	110
PL_Depression_angle	65
PL_FOV_Horizontal	10
PL_FOV_Vertical	7.5

39. Unfreeze ISD. On ISD WINDOW, press **State**. Count to ten.
40. Verify that after the count to ten, the image Coordinates, and angles data, and overlays appear on Output1 as shown on table [SRS0012-1] [SRS0012-2] [SRS0012-3]:

Payload Status Message			
TCS Displayed Field Title	TCS Expected Values	TCS Displayed Values if different	P/F
Center FOV Slant Range	2241.9		
Center FOV Lat	43:00:00.07		
Center FOV Lon	77:00:03.99		
LOS Incidence Angle	82:24:36.62		
LOS True Azimuth Angle	88:35:39.06		

41. Move cursor to the corners as illustrated below, and verify that the coordinates displayed match those on the table [SRS0012-1] [SRS0012-2] [SRS0012-3]:

Four Corners Table				
Corner	Latitude	P/F	Longitude	P/F
ULC	42:59:59.00		77:00:07.03	
URC	43:59:58.29		77:00:01.77	
LLC	43:00:01.89		77:00:06.25	
LRC	43:00:01.12		77:00:01.02	

42. On AVSI, set AV_Speed_Command to 100, Set Navigation_Mode to 6. The AV starts to make circular flights.
43. Verify that every 10 seconds the North Pointing arrow and the rest of the overlay and imagery data updates every 10 seconds. Execute count at least 12 changes (2 minutes). [SRS0065-4].
44. Observe if in Output1 window the North Pointing arrow makes a smooth 360 degree turn in opposite direction to the AV and its footprint [SRS0013-3].

45. On AVSI, set AV_Speed_Command to 0, Set Navigation_Mode to 7.
46. Set PL_Azimuth_Rate to 90, and set PL_Azimuth_Command to 0, and set AV_Heading to 0.
47. Set PL_Depression Angle to 60. Set Altitude to 1000.
48. Set PL_Azimuth_Rate to 1. Set PL_Azimuth_Command to 180.
49. Observe if in Output1 window the North Pointing arrow makes a smooth 180 degree turn in opposite direction to the footprint on the map [SRS0013-3].
50. Once the azimuth reaches 180 degrees, set PL_Azimuth_Command to 360, and Observe if the North Pointing arrow makes a smooth 180 degree turn in opposite direction to the footprint on the map [SRS0013-3].
51. Verify the North pointing arrow makes a 360 degree turn [SRS0013-3].
52. Switch frequencies back to 10 Hz. On ISD, change the fields as follows:

Fields	Value
Interface: AESM Frequency	10
Interface: AFSM Frequency	10
Interface: AISM Frequency	10
Interface: APSM Frequency	10

53. Test sensor selection and display (only for Predator).
54. Change Sensor to none. On ISD, change PL_Active_Sensor_Status to 0 (none).
55. Verify on Output1 display the sensor changed to none [SRS0065-5].
56. Change Sensor to Spotter. On ISD, change PL_Active_Sensor to 1 (Spotter).
57. Verify on Output1 display the sensor changed to Spotter [SRS0065-6].
58. Change Sensor to Wide Angle. On ISD, change PL_Active_Sensor to 2 (Wide Angle).
59. Verify on Output1 display the sensor changed to Wide Angle [SRS0065-7].
60. Change Sensor to Infrared. On ISD, change PL_Active_Sensor to 3.
61. Verify on Output1 display the sensor changed to Infrared [SRS0065-8].
62. On Output1 Display window, left-click on the Center FOV coordinates. Verify that the coordinates change to UTM system [SRS0065-a10].
63. On Output1 Display window, left-click on the Center FOV coordinates. Verify that the coordinates change to MGRS system [SRS0065-a11].
64. On Output1 Display window, left-click on the Center FOV coordinates. Verify that the coordinates change to Lat/Lon system [SRS0065-a12].

Steps 61 through 72 are for Predator AV Type only.

65. Test GPS time for week and sec with 0 value. On ISD, change the following variables as indicated on the following table:

ISD Fields	Values
AV_GPS_Sec	0
AV_GPS_Week	0

66. Verify that the date on Output1 is Jan 6, 1980; and the time is 00:00 [SRS0009-3] [SRS0009-4] [SRS0009-5].

67. Test GPS time for hr, min, and sec with 0 value. On ISD, change the following variables as indicated on the following table:

ISD Fields	Values
AV_GPS_Sec	0
AV_GPS_Week	750

68. Verify that the date on Output1 is May 22, 1994; and the time is 00:00 [SRS0009-2] [SRS0009-4] [SRS0009-5].

69. On ISD, change the following variables as indicated on the following table:

ISD Fields	Values
AV_GPS_Sec	86400
AV_GPS_Week	425

70. Verify that the date on Output1 is Feb 29, 1988; and the time is 00:00 [SRS0009-2] [SRS0009-4] [SRS0009-5].

71. On ISD, change the following variables as indicated on the following table:

ISD Fields	Values
AV_GPS_Sec	518400
AV_GPS_Week	633

72. Verify that the date on Output1 is a leap year, Feb 29, 1992; and the time is 00:00 [SRS0009-2] [SRS0009-4] [SRS0009-5].

73. On ISD, change the following variables as indicated on the following table:

ISD Fields	Values
AV_GPS_Sec	73810
AV_GPS_Week	748

74. Verify that the date on Output1 is May 8 1994, 20:30:10 [SRS0009-2] [SRS0009-4] [SRS0009-5].

75. On ISD, change the following variables as indicated on the following table:

ISD Fields	Values
AV_GPS_Sec	5000
AV_GPS_Week	500

76. Verify that the date on Output1 is August 69, 1989 [SRS0009-2] [SRS0009-4] [SRS0009-5].

77. Freeze ISD. On ISD WINDOW, press **State**.
78. Turn **Output1** off. On TCS, press on Video1 shortcut button. Output1 must disappears.
- 79.

2.4 Telemetry

The purpose of this Telemetry test procedure is to ensure that the TCS can receive and process telemetry data per the AV Standard Interface. Ranges of telemetry data will be for both Air Vehicle types. Telemetry data will be examined in all display windows.

Requirements: SRS0006, SRS0061.

Steps:

Setup TCS as Predator:

1. Open a terminal window and change to the schemes directory:

Select TCS, then TCS Xterm from the pulldown menu.

cd /h/TCS/data/schemas

2. Check symbolic link by entering:

ls -l

If 1->predator_v1.1 is observed TCS is in predator mode of operation and no changes need to be made. Proceed to step 4.

If 1->outrider_v1.1 IS observed TCS in outrider mode of operation and the link needs to be changed.

3. Change the symbolic link to predator by entering:

rm 1

ln -s predator_v1.1 1

which deletes the symbolic link of 1 to predator v1.1 and created a symbolic link of 1 to outrider_v1.1. Verify link by using **ls -l**. 1->predator_v1.1 should be observed.

4. Perform System Setup Procedure.

5. Verify the receipt of telemetry data. Start the ISD and enter some values to send telemetry data {SRS0006-1}.

6. Verify the non receipt of telemetry data does not affect TCS processing: video and Telemetry data, C4I message being sent (Frozen video, target message built, transmitting video imagery with overlay, Terminate processing of the RTP SIM [SRS0006-2]).

7. Verify AV Position Status (APSM) item ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-3]. Set APSM frequency to 3.

Element Name	Range of values	ISD	Valid/Invalid	P/F
Message_ID	1	0 1 3 -4 1	Invalid Valid Invalid Invalid Valid	
Message_Version	2	2 anything else	Valid Invalid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Type	$1 \leq x \leq 2$	1 5 0 -2 2	Valid Invalid Valid Invalid Valid	
1 Predator 2 Outrider				
AV_Type *Predator*	1	1 anything else	Valid Invalid	
AV_Tail_Number	N/A			
Mission_ID	$1 \leq x \leq 65535$	1 65535 65536 30000	Valid Valid Invalid Valid	
AV_Current_Nav_Altitude_Source	$1 \leq x \leq 4$	1 4 5 3 -8 2	Valid Valid Invalid Valid Invalid Valid	
Predator				
AV_Current_Nav_Altitude_Source	$2 \leq x \leq 3$	1 2 4 3	Invalid Valid Invalid Valid	
Outrider				
AV_Altitude	$-2,000 \leq x \leq 100,000$	-2000 100000 100001 -2001 0	Valid Valid Invalid Invalid Valid	
AV_Altitude *Predator*	$-3,000 \leq x \leq 60,000$	0 -3001 3000 60001 60000	Valid Invalid Valid Invalid Valid	
AV_Climb_Rate	$-5000 \leq x \leq 5000$	5000 5001 -5000 0 1000 -5001 1	Valid Invalid Valid Valid Valid Invalid Valid	
AV_Current_Nav_Position_Source	$1 \leq x \leq 4$	1 5 4 0 3	Valid Invalid Valid Invalid Valid	
AV_Latitude	$-90 \leq x \leq 90$	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Longitude	-180 < x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_NAV_Orientation_Source	1 <= x <= 4	1 5 4 0 3	Valid Invalid Valid Invalid Valid	
Predator				
AV_NAV_Orientation_Source	1	1 anything else	Valid Invalid	
Outrider				
AV_Roll	-180 <= x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Pitch	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Heading	0<= x < 360	0 360 -1 180 500 5	Valid Invalid Invalid Valid Invalid Valid	
AV_Pitch_Rate	-90 <= x <= 90	-90 -91 90 91 45	Valid Invalid Valid Invalid Valid	
AV_Roll_Rate	-180 <= x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Yaw_Rate	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Angle_Of_Attack_1	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Angle_Of_Attack_1 *Predator* Not supported by Outrider.	-204<= x <=204	-204 -205 204 205 0	Valid Invalid Valid Invalid Valid	
AV_Angle_Of_Attack_2 Not supported by Outrider.	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Angle_Of_Attack_2 *Predator*	-25.5<= x <= 25.5	-25.5 -25.6 25.5 25.6 0	Valid Invalid Valid Invalid Valid	
AV_AOA_Sensor_Active Not supported by Outrider.	1 <= x <= 2	1 0 2 3 1	Valid Invalid Valid Invalid Valid	
AV_AOA_Sensor_Active *Predator*	1 <= x <= 2	1 0 2 3 1	Valid Invalid Valid Invalid Valid	
AV_GPS_Time_Week Not supported by Outrider.	0 <= x < 1024	0 1024 1023 -1 1000	Valid Invalid Valid Invalid Valid	
AV_GPS_Time_Second Not supported by Outrider	0 <= x < 604800	0 604800 604799 -2 30000	Valid Invalid Valid Invalid Valid	
AV_GPS_Time_Ns Not supported by Predator or Outrider	0 <= x < 1000000000	0 1000000001 1000000000 -1 500000000 2000000000 5	Valid Invalid Valid Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Baro_Altitude	-2,000 <= x <= 100,000	-2000 -2001 100000 100001 0 200000 -100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Baro_Altitude *Predator*	-3000<=x<=60000	-3000 -3001 60000 60001 1000	Valid Invalid Valid Invalid 1000	
AV_Radar_Altitude Not supported by Predator or Outrider	-2,000 <= x <= 100,000	-2000 -2001 100000 100001 0 200000 -100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Magnetometer_Heading Not supported by Outrider	0 <= x < 360	0 360 -1 180 500 10	Valid Invalid Invalid Valid Invalid Valid	
AV_Ground_Track	0 <= x < 360	0 360 359 -1 180 500 200	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Ground_Speed	0 <= x <= 800	0 801 -1 800 999 200	Valid Invalid Invalid Valid Invalid Valid	
AV_Airspeed_1	0 <= x <= 600	0 601 600 -1 300	Valid Invalid Valid Invalid Valid	
AV_Airspeed_2 Predator (standard) Outrider (Not supported)	0 <= x <= 600	0 601 600 -1 300	Valid Invalid Valid Invalid Valid	
AV_Airspeed_Sensor_Active Outrider has only one sensor - Sensor active always "1"	1 <= x <= 2	1 0 2 3 1	Valid Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Measured_Wind_Heading Not supported by Outrider.	0 <= x < 360	0 361 -1 180 400 360 200	Valid Invalid Invalid Valid Invalid Invalid Valid	
AV_Measured_Wind_Speed Not supported by Outrider.	0 <= x <= 200	0 201 -1 100 300 50	Valid Invalid Invalid Valid Invalid Valid	
AV_Nav_Mode	1 <= x <= 7	1 8 7 0 5	Valid Invalid Valid Invalid Valid	
AV_Next_Waypoint	0 <= x <= 65535	0 65536 65535 -1 5000	Valid Invalid Valid Invalid Valid	
AV_TTG_Next_Waypoint	0 <= x <= 100000	0 100001 100000 -1 3000	Valid Invalid Valid Invalid Valid	
AV_Air_Temperature	-200 <= x <= 200	0 201 200 -201 -200 100	Valid Invalid Valid Invalid Valid Valid	

8. Verify INS Status item (AISM) ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-5]. Set frequency to 3.

Element Name	Range of values	TCS	Valid/Invalid	
Message_ID	1	0 1 3 -4 1	Invalid Valid Invalid Invalid Valid	
Message_ID *Predator*	2	2 anything else	Valid Invalid	
Message_Version	2	2 anything else	Valid Invalid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_Type	$1 \leq x \leq 2$	1 5 0 -2 2	Valid Invalid Valid Invalid Valid	
AV_Type *Predator*	1	1 anything else	Valid Invalid	
AV_Tail_Number *Predator*	N/A standard			
Mission_ID	$1 \leq x \leq 65535$	1 65535 65536 30000	Valid Valid Invalid Valid	
AV_INS_Er_NS Not supported by Predator.	$-2000 \leq x \leq 2000$	-2000 -2001 2000 2001 0 2100 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Er_EW Not supported by Predator.	$-2000 \leq x \leq 2000$	-2000 -2001 2000 2001 0 2100 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Er_Alt Not supported by Predator.	$-2000 \leq x \leq 2000$	-2000 -2001 2000 2001 0 2100 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Mode	$0 \leq x \leq 100$	0 101 100 -1 50	Valid Invalid Valid Invalid Valid	
AV_INS_Alt	$-2,000 \leq x \leq 100,000$	-2000 -2001 100000 100001 200000 0	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Alt *Predator*	$-3000 \leq x \leq 60000$	-3000 -3001 60000 60001	Valid Invalid Valid Invalid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_INS_Lat	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Lon	-180 < x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_East_Velocity	-2000 <= x <= 2000	-2000 -2001 2000 2001 0 2100 100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_North_Velocity	-2000 <= x <= 2000	-2000 -2001 2000 2001 0 2100	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Altitude_Velocity	-1000 <= x <= 1000	-1000 -1001 1000 1001 0 1100 100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_East_Acceleration	-300 <= x <= 300	300 -301 100 301 400 0	Valid Invalid Valid Invalid Invalid Valid	
AV_INS_North_Acceleration	-300 <= x <= 300	300 -301 100 301 400 0	Valid Invalid Valid Invalid Invalid Valid	
AV_INS_Altitude_Acceleration	-300 <= x <= 300	300 -301 100 301 400 0	Valid Invalid Valid Invalid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_INS_Pitch	-90<=x<=90	-90 -89 0 90 91 45	Invalid Valid Valid Valid Invalid Valid	
AV_INS_Roll	-180<=x<=180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Heading	0<=x<=360	0 361 -1 180 400 500 100	Valid Invalid Invalid Valid Invalid Invalid Valid	
AV_INS_Pitch_Rate	-90<=x<=90 Not supported by Predator.	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Roll_Rate	-180 <= x <= 180 Not supported by Predator.	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Yaw_Rate	-90 <= x <= 90 Not supported by Predator.	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Time_Week	0 <= x <= 1024 Not supported by Outrider	0 1025 500 -1 1000	Valid Invalid Valid Invalid Valid	
AV_INS_Time_Second	0 <= x <= 604800 Not supported by Outrider	0 604801 604800 -2 30000	Valid Invalid Valid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_INS_Time_Ns Not supported by Predator.	0 <= x <= 1000000000	0 -1 1000000001 50000 2000000000 1000000000	Valid Invalid Invalid Valid Invalid Valid	

9. Verify EOIR Status item ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-4].

Element Name	Range of values	TCS	Valid/Invalid	
Message_ID	4	0 4 3 -4	Invalid Valid Invalid Invalid	
Message_Version	2	2 anything else	Valid Invalid	
AV_Type	1 <= x <= 2	1 5 0 -2 2	Valid Invalid Valid Invalid Valid	
AV_Type *Predator*	1	1 anything else	Valid Invalid	
AV_Tail_Number	N/A			
Mission_ID	1 <= x <= 65535	1 65535 65536 30000	Valid Valid Invalid Valid	
PL_ID *Predator*	Not supported	n/a		
PL_ID *Outrider*	0 <= x <= 1	0 -1 1 2	Valid Invalid Valid Invalid	
PL_Active_Sensor	0 <= x <= 2	0 -1 2 3 1	Valid Invalid Valid Invalid Valid	
PL_Active_Sensor *Predator*	0 <= x <= 3	0 -1 3 4	Valid Invalid Valid Invalid	
PL_Active_Sensor_Status	0 <= x <= 5	0 -1 5 6 3	Valid Invalid Valid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid
PL_Pointing_Mode	0<=x<=2	0 -1 2 3 1	Valid Invalid Valid Invalid Valid
PL_Pointing_Mode *Predator*	0<=x<=1,3 ie 0, 1 or 3 not 2.	0 1 4 -1	Valid Valid Invalid Invalid
PL_Pointing_Mode *Outrider*	0<=x<=1	0 2 1 -1	Valid Invalid Valid Invalid
PL_Pointer_Lat	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid
PL_Pointer_Lon	-180 < x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid
PL_Depression_Angle	-90 <= x <= 120	-90 -91 120 121 0 999 100	Valid Invalid Valid Invalid Valid Invalid Valid
PL_Azimuth_Angle	0<= x < 360	0 -1 360 359 100 400 2	Valid Invalid Invalid Valid Valid Invalid Valid
PL_Depression_Rate Not supported by Predator.	-60 <= x <= 60	-60 -61 60 61 90 0 -30	Valid Invalid Valid Valid Invalid Valid Valid
PL_Azimuth_Rate Not supported by Predator.	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid

Element Name	Range of values	TCS	Valid/Invalid	
PL_LOS_Range_to_Target Not supported by Outrider.	0 <= x <= 200	0 201 -1 200 300 50	Valid Invalid Invalid Valid Invalid Valid	
PL_Ground_Range_to_Target Not supported by Outrider.	0 <= x <= 200	0 201 -1 100 300 50	Valid Invalid Invalid Valid Invalid Valid	
PL_Focal_Length	1 <= x <= 5000	1 0 5000 5001 1000 -2 100	Valid Invalid Valid Invalid Valid Invalid Valid	
PL_FOV_Horizontal	1 <= x <= 90	-90 -91 1 0 90 91 45	Invalid Invalid Valid Invalid Valid Invalid Valid	
PL_FOV_Vertical	1 <= x <= 90	-90 -91 1 0 90 91 45	Invalid Invalid Valid Invalid Valid Invalid Valid	
PL_IR_Polarity	0 <= x <= 1	0 -1 1 2	Valid Invalid Valid Invalid	
PL_IR_Gain Not supported by Outrider.	0 <= x <= 100	0 -1 100 101 30 999 50	Valid Invalid Valid Invalid Valid Invalid Valid	
PL_Image_Ang_to_North Not supported by Predator.	-180 < x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
PL_Image_Datum	0	0 anything else	Valid Invalid	

Element Name	Range of values	TCS	Valid/Invalid
PL_Image_Category *Predator and Outrider*	0 <= x <= 9	0 -1 9 10 5	Valid Invalid Valid Invalid Valid
PL_Image_Oblquity_Angle Not supported by Predator or Outrider.	0 <= x <= 90	0 -2 90 91 45	Valid Invalid Valid Invalid Valid
PL_Center_Point_Accuracy Not supported by Predator or Outrider.	0 <= x <= 2000	0 -1 2000 2001 1000	Valid Invalid Valid Invalid Valid
PL_Center_Point_Lat	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid
PL_Center_Point_Lon	-180 < x < 180	-180 -181 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid
PL_Image_Collection_Time_Week Not supported by Outrider.	0 <= x < 1024	0 -1 1024 1023 700	Valid Invalid Invalid Valid Valid
PL_Image_Collection_Time_Second Not supported by Outrider.	0 <= x < 604800	0 -2 604800 604799 300000 999999 100	Valid Invalid Invalid Valid Valid Invalid Valid
PL_Image_Collection_Time_Ns Not supported by Predator or Outrider.	0 <= x < 1000000000	0 -1 1000000000 1000000001 50000000	Valid Invalid Valid Invalid Valid

10. Verify Fuel Status item ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-6].

Element Name	Range of values	TCS	Valid/Invalid

Element Name	Range of values	TCS	Valid/Invalid	
Message_ID	8 only	0 8 3 4 -4 9	Invalid Valid Invalid Invalid Invalid Invalid	
Message_Version	2	2 anything else	Valid Invalid	
AV_Type	$1 \leq x \leq 2$ 1 only (1=predator)	1 5 0 -2 2	Valid Invalid Invalid Invalid Invalid	
AV_Tail_Number	N/A			
Mission_ID	$1 \leq x \leq 65535$	1 65535 65536 30000	Valid Valid Invalid Valid	
Fuel_Tank_ID	$1 \leq x \leq 4$	1 0 4 5 2	Valid Invalid Valid Invalid Valid	
Fuel_Tank_ID *Predator*	$0 \leq x \leq 1$	1 0 anything else	Valid Valid Invalid	
Fuel_Tank_Current_Level	$0 \leq x \leq 1000$	0 -1 1000 1001 400	Valid Invalid Valid Invalid Valid	
Fuel_Tank_Current_Level *Outrider*	$0 \leq x \leq 80$	0 81 20 -1 50	Valid Invalid Valid Invalid Valid	
Fuel_Tank_Flow_Rate_Out	$0 \leq x \leq 100$	0 -1 100 101 30 999 10	Valid Invalid Valid Invalid Valid Invalid Valid	
Fuel_Tank_Flow_Rate_In Not supported by Outrider.	$0 \leq x \leq 100$	0 -1 100 101 30 999 10	Valid Invalid Valid Invalid Valid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
Fuel_Tank_Pressure Not supported by Outrider.	0 <= x <= 100	0 -1 100 101 30 999 20	Valid Invalid Valid Invalid Valid Invalid Valid	

11. Verify the recording of telemetry data [SRS0061-1].
12. Verify data ranges of the DCM Mission Load Acknowledge Message. Enter values in, equal to, and above the ranges specified in the AVSI IDD for the DCM Mission Load Acknowledge Message. Capture the telemetry data and view the recorded data. Values with in the and equal to the limits will be accepted, Values out side the limits will be rejected. [SRS0006-7]

Element Name	Range of values	ISD	Valid/Invalid	P/F
Message_ID	38 only	38 anything else	Valid Invalid	
Message_Version				
AV_Type 1-predator 2-outrider	1only	1 anything else	Valid Invalid	
AV_Tail_Number	12 character string	Any 12 character string	Valid	
Mission_ID	1<=x<=65535	1 0 65535 65536 100	Valid Invalid Valid Invalid Valid	
New_Mission_Plan_ID	1<=x<=8000	1 0 8000 8001 100	Valid Invalid Valid Invalid Valid	
Mission_Plan_Load_Ack	1<=x<=6	1 0 6 7 3	Valid Invalid Valid Invalid Valid	
Last_Waypoint_Received	0<=x<=# of waypoints in the plan being transferred	0 -1 last waypoint last waypoint+1 a middle waypoint	Valid Invalid Valid Invalid Valid	

Shutdown TCS.

13. At the TCS Main window, select **Exit**.
14. Change TCS to Outrider mode.

In a terminal window:

```
cd /h/TCS/data/schemas
rm 1
ln -s outrider_v1.1 1
```

Note: The following values need to be changed when ISD is started:

AV Type: 2
 AISM: AV_INS_Mode: 1
 APSM: AV_Current_Nav_Alt_Source: 2
 Vehicle Fuel Level: 75

15. Verify the receipt of telemetry data. Start the ISD and enter some values to send telemetry data [SRS0006-1].
16. Verify the non receipt of telemetry data does not affect TCS processing: NOs, video and Telemetry data, C4I message being sent (Frozen video, target message built, transmitting video imagery with overlay, Terminate processing of the RTP SIM [SRS0006-2]).
17. Verify AV Position Status (APSM) item ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-3]. Set APSM frequency to 3.

Element Name	Range of values	ISD	Valid/Invalid	P/F
Message_ID	1 only	0 1 3 -4 1	Invalid Valid Invalid Invalid Valid	
Message_Version	2	2 anything else	Valid Invalid	
AV_Type	1 <= x <= 2	1 5	Invalid Invalid	
1 Predator 2 Outrider	2 only	0 -2 2	Invalid Invalid Valid	
AV_Type *Predator*	1	1 anything else	Valid Invalid	
AV_Tail_Number	N/A			
Mission_ID	1 <= x <= 65535	1 65535 65536 30000	Valid Valid Invalid Valid	
AV_Current_Nav_Altitude_Source *Predator*	1 <= x <= 4	1 4 5 3 -8 2	Valid Valid Invalid Valid Invalid Valid	
AV_Current_Nav_Altitude_Source *Outrider*	2 <= x <= 3	1 2 4 3	Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Altitude	-2,000 <= x <= 100,000	-2000 100000 100001 -2001 0	Valid Valid Invalid Invalid Valid	
AV_Altitude *Predator*	-3,000 <= x <= 60,000	0 -3001 3000 60001 60000	Valid Invalid Valid Invalid Valid	
AV_Climb_Rate	-5000 <= x <= 5000	5000 5001 -5000 0 1000 -5001 1	Valid Invalid Valid Valid Valid Invalid Valid	
AV_Current_Nav_Position_Source	1 <= x <= 4 (1 only)	1 5 4 0 3	Valid Invalid Valid Invalid Valid	
AV_Latitude	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Longitude	-180 <= x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_NAV_Orientation_Source *Predator*	1 <= x <= 4	1 5 4 0 3	Valid Invalid Valid Invalid Valid	
AV_NAV_Orientation_Source *Outrider*	1	1 anything else	Valid Invalid	
AV_Roll	-180 <= x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Pitch	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Heading	0 <= x < 360	0 360 -1 180 361 500 5	Valid Invalid Invalid Valid Invalid Invalid Valid	
AV_Pitch_Rate	-90 <= x <= 90	-90 -91 90 91 45	Valid Invalid Valid Invalid Valid	
AV_Roll_Rate	-180 <= x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Yaw_Rate	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Angle_Of_Attack_1	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Angle_Of_Attack_1 *Predator* Not supported by Outrider.	-204 <= x <= 204	-204 -205 204 205 0	Valid Invalid Valid Invalid Valid	
AV_Angle_Of_Attack_2 Not supported by Outrider.	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_Angle_Of_Attack_2 *Predator*	-25.5 <= x <= 25.5	-25.5 -25.6 25.5 25.6 0	Valid Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_AOA_Sensor_Active Not supported by Outrider.	1 <= x <= 2	1 0 2 3	Valid Invalid Valid Invalid	
AV_AOA_Sensor_Active *Predator*	1 <= x <= 2	1 0 2 3	Valid Invalid Valid Invalid	
AV_GPS_Time_Week Not supported by Outrider.	0 <= x < 1024	0 1024 1023 -1 1000	Valid Invalid Valid Invalid Valid	
AV_GPS_Time_Second Not supported by Outrider	0 <= x < 604800	0 604800 604799 -2 30000	Valid Invalid Valid Invalid Valid	
AV_GPS_Time_Ns Not supported by Predator or Outrider	0 <= x < 10000000000	0 1000000001 1000000000 -1 500000000 2000000000 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Baro_Altitude	-2,000 <= x <= 100,000	-2000 -2001 100000 100001 0 200000 -100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Baro_Altitude *Outrider*	0 <= x <= 15000	0 -1 15000 15001 5000	Valid Invalid Valid Invalid Valid	
AV_Baro_Altitude *Predator*	-3000 <= x <= 60000	-3000 -3001 60000 60001	Valid Invalid Valid Invalid	
AV_Radar_Altitude Not supported by Predator or Outrider	-2,000 <= x <= 100,000	-2000 -2001 100000 100001 0 200000 -100	Valid Invalid Valid Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Magnetometer_Heading Not supported by Outrider	0 <= x < 360	0 360 -1 180 500 10	Valid Invalid Invalid Valid Invalid Valid	
AV_Ground_Track	0 <= x < 360	0 360 359 -1 180 500 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_Ground_Speed	0 <= x <= 800	0 801 -1 800 999 200	Valid Invalid Invalid Valid Invalid Valid	
AV_Ground_Speed *Outrider*	0<=x<=255	255 256 0 -1 100	Valid Invalid Valid Invalid Valid	
AV_Airspeed_1	0 <= x <= 600	0 601 600 -1 300	Valid Invalid Valid Invalid Valid	
AV_Airspeed_2 Predator (standard) Outrider (Not supported)	0 <= x <= 600	0 601 600 -1 300	Valid Invalid Valid Invalid Valid	
AV_Airspeed_Sensor_Active Outrider has only one sensor - Sensor active always "1"	1 <= x <= 2	1 0 2 3	Valid Invalid Valid Invalid	
AV_Airspeed_Sensor_Active *Outrider* has only one sensor - Sensor active always "1"	1	1 anything else	Valid Invalid	
AV_Measured_Wind_Heading Not supported by Outrider.	0 <= x < 360	0 361 -1 180 400 360	Valid Invalid Invalid Valid Invalid Valid	

Element Name	Range of values	ISD	Valid/Invalid	P/F
AV_Measured_Wind_Speed Not supported by Outrider.	0 <= x <= 200	0 201 -1 100 300 50	Valid Invalid Invalid Valid Invalid Valid	
AV_Nav_Mode	1 <= x <= 7	1 8 7 0 5	Valid Invalid Valid Invalid Valid	
AV_Nav_Mode *Outrider*	1<=x<=6,8	1 8 7 0 5	Valid Valid Invalid Invalid Valid	
AV_Next_Waypoint	0 <= x <= 65535	0 65536 65535 -1 5000	Valid Invalid Valid Invalid Valid	
AV_Next_Waypoint *Outrider*	0<=x<=99	0 -1 99 100 50	Valid Invalid Valid Invalid Valid	
AV_TTG_Next_Waypoint	0 <= x <= 100000	0 100001 100000 -1 3000	Valid Invalid Valid Invalid Valid	
AV_Air_Temperature	-200 <= x <= 200	0 201 200 -201 -200 100	Valid Invalid Valid Invalid Valid Valid	

18. Verify INS Status item (AISM) ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-5]. Set frequency to 3.

Element Name	Range of values	TCS	Valid/Invalid	
Message_ID *Outrider*	2 only	2 anything else	Valid Invalid	
Message_ID *Predator*	2	2 anything else	Valid Invalid	
Message_Version	2	2 anything else	Valid Invalid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_Type STD	$1 \leq x \leq 2$	1 5 0 -2 2	Valid Invalid Valid Invalid Valid	
AV_Type *Predator*	1	1 anything else	Valid Invalid	
AV_Type *Outrider*	2 only	2 anything else	Valid Invalid	
AV_Tail_Number *Predator*	N/A standard			
Mission_ID	$1 \leq x \leq 65535$	1 65535 65536 30000	Valid Valid Invalid Valid	
AV_INS_Er_NS Not supported by Predator or Outrider.	$-2000 \leq x \leq 2000$	-2000 -2001 2000 2001 0 2100 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Er_EW Not supported by Predator or Outrider.	$-2000 \leq x \leq 2000$	-2000 -2001 2000 2001 0 2100 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Er_Alt Not supported by Predator or Outrider.	$-2000 \leq x \leq 2000$	-2000 -2001 2000 2001 0 2100 5	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Mode	$0 \leq x \leq 100$	0 101 100 -1 50	Valid Invalid Valid Invalid Valid	
AV_INS_Mode *Outrider*	$0 \leq x \leq 7$	0 8 7 5	Valid Invalid Valid Valid	
AV_INS_Alt	$-2,000 \leq x \leq 100,000$	-2000 -2001 100000 100001 200000 0	Valid Invalid Valid Invalid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_INS_Alt *Predator*	-3000 <= x <= 60000	-3000 -3001 60000 60001	Valid Invalid Valid Invalid	
AV_INS_Lat	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Lon	-180 < x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_East_Velocity Not supported by Predator.	-2000 <= x <= 2000	-2000 -2001 2000 2001 0 2100 100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_North_Velocity Not supported by Predator.	-2000 <= x <= 2000	-2000 -2001 2000 2001 0 2100	Valid Invalid Valid Valid Valid Invalid	
AV_INS_Altitude_Velocity Not supported by Predator.	-1000 <= x <= 1000	-1000 -1001 1000 1001 0 1100 100	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_East_Acceleration Not supported by Predator.	-300 <= x <= 300	300 -301 100 301 400 0	Valid Invalid Valid Invalid Invalid Valid	
AV_INS_North_Acceleration Not supported by Predator.	-300 <= x <= 300	300 -301 100 301 400 0	Valid Invalid Valid Invalid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_INS_Altitude_Acceleration Not supported by Predator.	-300 <= x <= 300	300 -301 100 301 400 0	Valid Invalid Valid Invalid Invalid Valid	
AV_INS_Pitch	-90<x<=90	-90 -91 0 90 91 45	Invalid Invalid Valid Valid Invalid Valid	
AV_INS_Roll	-180<=x<=180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Heading	0<=x<=360	0 361 -1 180 400 500 100	Valid Invalid Invalid Valid Invalid Invalid Valid	
AV_INS_Pitch_Rate Not supported by Predator.	-90<=x<=90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Roll_Rate Not supported by Predator.	-180 <= x <= 180	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
AV_INS_Yaw_Rate Not supported by Predator.	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
AV_INS_Time_Week Not supported by Outrider	0 <= x <= 1024	0 1025 500 -1 1000	Valid Invalid Valid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
AV_INS_Time_Second Not supported by Outrider	0 <= x <= 604800	0 604801 604800 -2 30000	Valid Invalid Valid Invalid Valid	
AV_INS_Time_Ns Not supported by Predator or Outrider.	0 <= x <= 1000000000	0 -1 1000000001 50000 2000000000 1000000000	Valid Invalid Invalid Valid Invalid Valid	

19. Verify EOIR Status item ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-4].

Element Name	Range of values	TCS	Valid/Invalid	
Message_ID	4 only	4 anything else	Valid Invalid	
Message_Version	2 only	2 anything else	Valid Invalid	
AV_Type	1 <= x <= 2	1 5 0 -2 2	Valid Invalid Valid Invalid Valid	
AV_Type *Predator*	1	1 anything else	Valid Invalid	
AV_Type *Outrider*	2	2 anything else	Valid Invalid	
AV_Tail_Number	N/A			
Mission_ID	1 <= x <= 65535	1 65535 65536 30000	Valid Valid Invalid Valid	
PL_ID *Predator*	Not supported	n/a		
PL_ID *Outrider*	0<=x<=1	0 -1 1 2	Valid Invalid Valid Invalid	
PL_Active_Sensor *Outrider*	0 <= x <= 2	0 -1 2 3 1	Valid Invalid Valid Invalid Valid	
PL_Active_Sensor *Predator*	0<=x<=3	0 -1 3 4	Valid Invalid Valid Invalid	

Element Name	Range of values	TCS	Valid/Invalid	
PL_Active_Sensor_Status	$0 \leq x \leq 5$	0 -1 5 6 3	Valid Invalid Valid Invalid Valid	
PL_Pointing_Mode	$0 \leq x \leq 2$	0 -1 2 3 1	Valid Invalid Valid Invalid Valid	
PL_Pointing_Mode *Predator*	$0 \leq x \leq 1, 3$?1,3 or 1.3?	0 1 4 -1	Valid Valid Invalid Invalid	
PL_Pointing_Mode *Outrider*	$0 \leq x \leq 1$	0 2 1 -1	Valid Invalid Valid Invalid	
PL_Pointer_Lat	$-90 \leq x \leq 90$	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
PL_Pointer_Lon	$-180 < x \leq 180$	-180 -185 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid	
PL_Depression_Angle	$-90 \leq x \leq 120$	-90 -91 120 121 0 999 100	Valid Invalid Valid Invalid Valid Invalid Valid	
PL_Azimuth_Angle	$0 \leq x < 360$	0 -1 360 359 100 400 2	Valid Invalid Invalid Valid Valid Invalid Valid	
PL_Depression_Rate Not supported by Predator.	$-60 \leq x \leq 60$	-60 -61 60 61 90 0 -30	Valid Invalid Valid Invalid Invalid Valid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
PL_Azimuth_Rate Not supported by Predator.	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid	
PL_LOS_Range_to_Target Not supported by Outrider.	0 <= x <= 200	0 201 -1 200 300 50	Valid Invalid Invalid Valid Invalid Valid	
PL_Ground_Range_to_Target Not supported by Outrider.	0 <= x <= 200	0 201 -1 100 300 50	Valid Invalid Invalid Valid Invalid Valid	
PL_Focal_Length	1 <= x <= 5000	1 0 5000 5001 1000 -2 100	Valid Invalid Valid Invalid Valid Invalid Valid	
PL_FOV_Horizontal	1 <= x <= 90	-91 1 0 90 91 45	Invalid Valid Invalid Valid Invalid Valid	
PL_FOV_Vertical	1 <= x <= 90	-91 1 0 90 91 45	Invalid Valid Invalid Valid Invalid Valid	
PL_IR_Polarity	0 <= x <= 1	0 -1 1 2	Valid Invalid Valid Invalid	
PL_IR_Gain Not supported by Outrider.	0 <= x <= 100	0 -1 100 101 30 999 50	Valid Invalid Valid Invalid Valid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid
PL_Image_Ang_to_North Not supported by Predator.	-180 < x <= 180	-180 -185 180 181 0 200 45	Invalid Invalid Valid Invalid Valid Invalid Valid
PL_Image_Datum	0	0 anything else	Valid Invalid
PL_Image_Category *Predator and Outrider*	0 <= x <= 9	0 -1 9 10 5	Valid Invalid Valid Invalid Valid
PL_Image_Obliquity_Angle Not supported by Predator or Outrider.	0 <= x <= 90	0 -2 90 91 45	Valid Invalid Valid Invalid Valid
PL_Center_Point_Accuracy Not supported by Predator or Outrider.	0 <= x <= 2000	0 -1 2000 2001 1000	Valid Invalid Valid Invalid Valid
PL_Center_Point_Lat	-90 <= x <= 90	-90 -91 0 90 91 45	Valid Invalid Valid Valid Invalid Valid
PL_Center_Point_Lon	-180 < x <= 180	-180 -181 180 181 0 200 45	Valid Invalid Valid Invalid Valid Invalid Valid
PL_Image_Collection_Time_Week Not supported by Outrider.	0 <= x < 1024	0 -1 1024 1023 700	Valid Invalid Invalid Valid Valid
PL_Image_Collection_Time_Second Not supported by Outrider.	0 <= x < 604800	0 -2 604800 604801 300000 999999 100	Valid Invalid Valid Invalid Valid Invalid Valid

Element Name	Range of values	TCS	Valid/Invalid	
PL_Image_Collection_Time_Ns	0 <= x < 1000000000 Not supported by Predator or Outrider.	0 -1 1000000000 1000000001 50000000	Valid Invalid Valid Invalid Valid	

20. Verify Fuel Status item ranges are displayed and are checked. Verify max/min, and out of limits. After an invalid input results in a error indication, verify valid inputs clear the error indication [SRS0006-6].

Element Name	Range of values	TCS	Valid/Invalid	
Message_ID	8 only	8 anything else	Valid Invalid	
Message_Version	2 only	2 anything else	Valid Invalid	
AV_Type 2=outrider	1 <= x <= 2 2 only	2 anything else	Valid Invalid	
AV_Tail_Number	N/A			
Mission_ID	1 <= x <= 65535	1 65535 65536 30000	Valid Valid Invalid Valid	
Fuel_Tank_ID	1 <= x <= 4	1 -1 4 5 2	Valid Invalid Valid Invalid Valid	
Fuel_Tank_ID *Outrider*	1 only	1 anything else	Valid Invalid	
Fuel_Tank_ID *Predator*	0 <= x <= 1	1 0 anything else	Valid Valid Invalid	
Fuel_Tank_Current_Level	0 <= x <= 1000	0 -1 1000 1001 400	Valid Invalid Valid Invalid Valid	
Fuel_Tank_Current_Level *Outrider*	0<=x<=80	0 81 20 -1 50	Valid Invalid Valid Invalid Valid	
Fuel_Tank_Flow_Rate_Out	0 <= x <= 100	0 -1 100 101 30 999 10	Valid Invalid Valid Invalid Valid Invalid Valid	

Element Name	Range of values	TCS	Valid/Invalid	
Fuel_Tank_Flow_Rate In Not supported by Outrider.	0 <= x <= 100	0 -1 100 101 30 999 10	Valid Invalid Valid Invalid Valid Invalid Valid	
Fuel_Tank_Pressure Not supported by Outrider.	0 <= x <= 100	0 -1 100 101 30 999 20	Valid Invalid Valid Invalid Valid Invalid Valid	

21. Verify the recording of telemetry data [SRS0061-1].
22. Verify data ranges of the DCM Mission Load Acknowledge Message. Enter values in, equal to, and above the ranges specified in the AVSI IDD for the DCM Mission Load Acknowledge Message. Capture the telemetry data and view the recorded data. Values with in the and equal to the limits will be excepted, Values out side the limits will be rejected. [SRS0006-7]

Element Name	Range of values	ISD	Valid/Invalid	P/F
Message_ID	38 only	38 anything else	Valid Invalid	
Message_Version				
AV_Type 1-predator 2-outrider	1only	1 anything else	Valid Invalid	
AV_Tail_Number	12 character string	Any 12 character string	Valid	
Mission_ID	1<=x<=65535	1 0 65535 65536 100	Valid Invalid Valid Invalid Valid	
New_Mission_Plan_ID	1<=x<=8000	1 0 8000 8001 100	Valid Invalid Valid Invalid Valid	
Mission_Plan_Load_Ack	1<=x<=6	1 0 6 7 3	Valid Invalid Valid Invalid Valid	
Last_Waypoint_Received	0<=x<=# of waypoints in the plan being transferred	0 -1 last waypoint last waypoint+1 a middle waypoint	Valid Invalid Valid Invalid Valid	

2.5 C4I Tactical Messages

The purpose of the C4I Tactical Messages test procedure is to examine creating and sending of tactical message to C4I system per the IDDs. The capturing of target data from NITF imagery will be examined in this procedure. Ranges of C4I message operator entry fields will be examined during this test procedure. The three tactical messages defined in the SRS are ATI;CDR, SALUTE, and RECCEXREP. Only RECCEXREP is implemented in the software build. STR TD0031 was written.

Requirements: SRS0034, SRS0036, SRS0037, SRS0039, SRS0096, SRS0097, SRS0098, SRS0101, SRS0102, and SRS0258.

Steps:

Test RECCEXREP message

1. Perform System Setup Procedure.
2. At ISD, ensure field values for **EO_IR_Pointing_Lat**, **EO_IR_Pointing_Lon**, **GPS_Time_Sec** are changing.
3. Verify the RECCEXREP entry items are displayed by selecting **Comms** then **Tac Msg...** from the pulldown menu, then select the **RECCEXREP** tab. Ensure the RECCEXREP window is displayed.

Check target data entry

4. Power up the VCR, load a tape and push play.
5. Display the TDBM window by selecting **Comms**, then **TDBM...** from the pulldown menu.
6. At the TCS console, select Output 1. Ensure video is displayed.

Lat/Long coordinates in the TDBM window:

7. Verify Operator option to manually enter Target Data by entering Coordinates of 77-33-33N 66-22-22W and Time 233434Z [SRS0036-1].
8. Verify Operator option to manually revise Target Data manually entered by entering Coordinates of 44-11-22S 033-11-56E and time 303030Z [SRS0097-1].
9. Verify Operator option to revise manually entered data by capturing target data. Ensure VCR is on and playing, video is displayed, then capture target data by clicking in video display window. Manually entered data will be replaced by captured data [SRS0097-2, SRS0096-2, SRS0034-2].
10. Verify Operator option to revise captured target data by capturing new target data. Capture target data by clicking in video display window. Previously captured target data will be replaced by newly captured data [SRS0097-3].
11. Verify Operator option to revise captured target data by manually entering new target data. Enter coordinates of 44-11-22S 033-11-56E and time 303030Z [SRS0097-4].
12. Verify the Target Data item ranges are displayed and are checked in the TDBM entry window. Ensure when Invalid entry range is displayed [SRS0036-2, SRS0036-3, SRS0036-4]. Note: STR TD0024 Documents 0 to 999999 error tutorial. STR TD0025 documents 59 minutes for North Latitude inhibits entry of seconds.

RECCEXREP	Range	TCS	Valid/invalid	P/F
-----------	-------	-----	---------------	-----

Enter and send a RECCEXREP message.

13. In the RECCEXREP window enter the name, supp, email destination (tcs) [SRS0037-1].
14. In the TDBM window enter country code, Org type, echelon, heading, speed, Short name, Long name.
15. Click on a point of interest in the video window to transfer coordinates to the TDBM window.
16. Select apply in the TDBM window and verify the track/target is transferred to the list in the RECCEXREP window. Verify a corresponding target icon is displayed on the Charts display.
17. Select SEND in the RECCEXREP window. Verify target/track is cleared from the list in the RECCEXREP window.
18. Verify the TARGET_TRACK and the RECCEXREP_OP_ENTRY data is sent to the DII/COE Common Message Processor (CMP) for creation of a RECCEXREP_MSG addressable to ASAS [SRS0039-1].
19. Verify transmission of Target Data and RECEXREP OP Entry to DII/COE for creation and transmission to JMCIS [SRS0098-1].
20. Verify the contents of the message log in mail.
21. Ensure the RECCEXREP data is cleared and default data is entered [SRS0101-4].
22. Select the **Close** button. Ensure the Tactical Communication window is closed.
23. Verify Targeting Data can be captured without having TACCOM active. Click in the video window and verify coordinates are transferred to the TDBM window [SRS0101-8].
24. Verify RECCEXREP message cannot be sent with blank fields. Open the TACCOM window by selecting **COMMS, Tac Msg**. Select **send**. Message is not sent [SRS0102-2].
25. Move mouse in the Video window and click left button near one of the corners. Verify the target position changes to new coordinate and time in the TDBM window.
26. Select the **Close** button. Ensure Tactical Communication window is closed.

Verify tracks can be retrieved from the TDBM.

27. Display the TDBM window by selecting **Comms**, then **TDBM...** from the pulldown menu.
28. Verify the RECCEXREP entry items are displayed by selecting **Comms** then **Tac Msg...** from the pulldown menu, then select the **RECCEXREP** tab. Ensure the RECCEXREP window is displayed.
29. Verify operator entry ranges for the RECCEXREP window are displayed and checked. Enter values "Just Above, Just Below, and Equal To" one at a time for each item in the RECEXREP message [SRS0037-2].
30. Retrieve track from the TDBM. Select send at the Tactical Message window. Verify the contents of the message in mail [SRS0258-1].
- 31.

2.6 NITF Messages

The purpose of the NITF Messages test procedure is to ensure that NTSC video can be captured as digital still imagery and downlink telemetry data can be incorporated in a NITF file. The TCS program is required to transmit NITF digital imagery to C4I systems. The transfer protocols are Network File Sharing (NFS) and File Transfer Protocol (FTP). For this level of testing, the protocol method will be tested rather than transferring NITF file to each C4I system. The SI&T will be required to test the transfer of the NITF file to each C4I system when resources are available. The C4I IDDS specify that NITF images will be transferred to ASAS, Precision Targeting Workstation (PTW), and JMCIS by FTP and to JMCIS and JSTARS by NFS. The IDDS for ETRAC and JDISS do not specify a method.

Requirements: SRS0025, SRS0026, SRS0027, SRS0028, SRS0029, SRS0033, SRS0076, SRS0077, SRS0078, SRS0080, SRS0081.

Steps:

1. Perform System Setup Procedure.
2. Power up the VCR, load tape and push **Play**, and press **Pause**. The image on the monitor must be a still image.
3. On TCS Main, left-click on **Video1** shortcut button. Output1 window is displayed.
4. On ISD, right-click on the fields specified on table, and set them to the specified values.
5. On AVSI ISD driver, left click State and make sure ISD is running.

Payload Status Message	
ISD Field Title	ISD Values
AV Tail Number	AB12
Mission ID	1111
AV Current Navigation Position Source	2
AV Altitude Command	2222.22
AV Latitude	43
AV Longitude	77
AV Heading Command	60
AV Ground Track	0
Next Waypoint	0
AV Airspeed Command	100
AV GPS Time Weeks	425
AV GPS Time Seconds	86400
AV Roll Command	15
AV Pitch Command	20
AV Yaw Rate	0
AV Climb Rate	5000
AV INS Altitude Acceleration	300
PL Active Sensor	1
PL_Azimuth Command	110
PL_Depression Command	65
Payload Focal Length	10
Payload Pointing Mode	0

6. Observe if the Image Coordinates, angles data, and overlays appear on Output1 as shown on table . If not, annotate them on table:

Image Data	Value	Value if Different from Expected
Center FOV Slant Range	2241.9	
Center FOV Lat	43:00:00.07	
Center FOV Lon	77:00:03.99	
LOS Incidence Angle	82:24:36.62	
LOS True Azimuth Angle	88:35:39.06	
Date	Feb 29, 1988;	
Time	0:0	

7. Move cursor to the corners as illustrated below, and verify that the coordinates displayed match those on the table. If not a match, annotate the displayed coordinate:

Four Corners Table						
Corner	Expected Latitude	Latitude Different from Expected	P/F	Expected Longitude	Longitude Different from Expected	P/F
ULC	42:59:59.00			77:00:07.03		
URC	42:59:58.29			77:00:01.77		
LLC	43:00:01.89			77:00:06.25		
LRC	43:00:01.02			77:00:01.02		

8. On Output1, left-click on the short cut button **Video Capture**, and annotate the file name that appear on the bottom of the window: _____
9. Open an Xterm window. On DII, left click on the pull down menu **TCS**, left click **Xterm**.
10. Select the /h/NITFS/bin directory. On the Xterm window, type **cd /h/NITFS/bin**, and press enter.
11. Run the **NITF Editor**. On the Xterm window, type **NITFSnitfedit**, and press enter. The **NITF Editor** window appears.
12. Load a file NITF file. On the **NITF Editor**, left-click **Unpack**. Select the directory. Move from **/h/data/local/NITFS/tmp/** to **/h/TCS/data/video_frames/*** and hit select **OK**.
13. Using the scroll bar, look for the last file that contains the NITF extension. Select it, and **OK**.
14. Open the **Show Header** window. Left-click on the **Overview Setup** button. The **Show Header** window appears.
15. Select the right format to view the picture. In the **Show Header** window, left-click on the pull right menu **Overview Size**, select **1024**, and press **OK**.
16. View the Capture image. On the Show Header window, left-click the on the **Display Overview** button. The Captured image appears on **Image Overview** window. Verify that the capture image is the same as on the video monitor [SRS0025-1] [SRS0027-1] [SRS0077-1] [SRS0080-1].
17. Close the **Image Overview** window. On the Image Overview window, left-click on **done**. Verify that the Image is removed from the screen [SRS0081-1].

18. Open the **Image Header** window. On the Show Header window, left-click on the **Image** button. The **Select Image_pupop** window appears. Select the Image header to review (the last on the list), and-left **OK**. The **Image Header** window appears.
19. Open the **Image Location** window. On the **Image Header** window left-click on **Location**. The **Image Location** window opens.
20. On the **Image Location** window, verify if the four corners windows match the following data [SRS0076-1] [SRS0078-1]:

Four Corners Coordinates						
Corner	Expected Latitude	Latitude Different from Expected	P/F	Expected Longitude	Longitude Different from Expected	P/F
ULC	42:59:59.00			77:00:07.03		
URC	42:59:58.29			77:00:01.77		
LLC	43:00:01.89			77:00:06.25		
LRC	43:00:01.02			77:00:01.02		

21. Close the **Image Location** window. On the **Image Location** window, left-click **OK**.
22. Close the **Image Header** window. On the **Image Header** window, left-click **OK**.
23. Open the **Text Header** window. On the **NITF Editor**, left click on **TEXT**. The **Select Text Popup** window opens. In the **Select Text Popup** window, select the file to view (the last on the list), and left-click **OK**. The **Text Header** window opens.
24. Open the **Text Edit** window. In the **Text Header** window, left-click **Edit**, and the **Text Edit** window appears.
25. Verify that the data on the **Text Edit** window follows the following format [SRS0026-1] [SRS0028-1]:

AV Tail Number _____
 AV Tail Number _____
 Mission ID _____
 AV Current Navigation Position Source _____
 AV Latitude _____ degrees
 AV Longitude _____ degrees
 AV Barometric Altitude _____ feet
 AV True Heading _____ degrees
 AV Ground Track _____ degrees
 Next Waypoint _____
 AV Airspeed _____ knots
 AV GPS time in Weeks _____ weeks (week zero is Jan. 6, 1980)
 AV GPS time in Seconds _____ seconds (week zero is Jan. 6, 1980)
 AV Roll _____ degrees
 AV Pitch _____ degrees
 AV Yaw Rate _____ degrees per second
 AV Climb Rate _____ feet per minute
 AV INS Altitude Acceleration _____ feet per second square
 Active Sensor _____
 PL_Azimuth _____ degrees
 PL_Depression_angle _____ degrees

Payload Center FOV Lat _____ degrees
 Payload Center FOV Lon _____ degrees
 Payload Focal Length _____ millimeters
 Payload LOS Range to Target _____ Nautical Miles
 Payload Pointing Mode _____

26. Verify if the Telemetry data corresponds to the values on Table:

Telemetry Data			
Telemetry Field Title	Telemetry Expected Value	Telemetry Displayed Value if different	P/F
AV Tail Number	AB12		
Mission ID	1111		
AV Current Navigation Position Source	2		
AV Latitude	43		
AV Longitude	77		
AV Barometric Altitude	2222.22		
AV True Heading	60		
AV Ground Track	0		
Next Waypoint	0		
AV Airspeed	100		
AV GPS time in Weeks	425		
AV GPS time in Seconds	86400		
AV Roll	15		
AV Pitch	20		
AV Yaw Rate	0		
AV Climb Rate	5000		
AV INS Altitude Acceleration	300		
Acive Sensor	1		
PL_Azimuth	110		
PL_Depression_angle	65		
Payload Center FOV Lat	43:00:00.07		
Payload Center FOV Lon	77:00:03.99		
Payload Focal Length	10		
Payload LOS Range to Target	2241.9		
Payload Pointing Mode	0		

27. On the **Telemetry Data** window, left click at the bottom of the window, and type “**This is a test**”, and press **OK**.
28. Close the **Text Header** window. On the **Text Header** window, press **OK**.
29. Open the **Text Header** window. On the **NITF Editor**, left click on **TEXT**. The **Select Text Popup** window opens. In the **Select Text Popup** window, select the file to view (the last on the list), and left-click **OK**. The **Text Header** window opens.
30. Open the **Text Edit** window. In the **Text Header** window, left-click **Edit**, and the **Text Edit window** appears.
31. Verify that the **Telemetry Data** window contains the previously entered text type “**This is a test**” [SRS0029-1].

32. Close the **Text Edit** window. On the **Text Edit** window, press **OK**.
33. Close the **Text Header** window. On the **Text Header** window, press **OK**.
34. Close the **NITF Editor** application. On the **NITF Editor**, press **EXIT**.
35. Verify the captured NITF images are viewable on the PTW using NFS Transfer [SRS0033-1]. Use the PTW procedure to power up and display the NITF image.

2.7 Payload Control

The purpose of the Payload Control test procedure is to ensure that the TCS can send payload control commands per the AV Standard Interface with the control elements specified in the SRS. The procedure is divided into two parts. The first section verifies that the TCS generated payload commands are received by ISD simulator and contain the expected values. The second section verifies that the states and modes that are commanded at TCS result in the expected responses from the DCMs.

Requirements: SRS0127, SRS0222, SRS0223, SRS224, SRS0225, SRS0226

Steps:

Section A: States/Modes are commanded at TCS and receipt is verified at the simulator.

1. Run the System setup procedure.
2. Open a video window by selecting **Output 1**.
3. Verify the powering off the EOIR camera. In the video window, Select the **OFF** button. Verify the response on the ISD[SRS0222-2][SRS0223-1]. ECM:EO_Power =0, ECM:IR_Power=0, ECM:EOIR_Payload_Active=0 ECM:EOIR_Payload_Camera_Select=0(outrider always one)
4. Verify the powering and selection for control of the EO-wide. In the video window, Select the **EO-wide** button. Verify the response on the ISD[SRS0222-1][SRS0223-2]. ECM:EO_Power =1, ECM:EOIR_Payload_Active=1 ECM:EOIR_Payload_Camera_Select=1(outrider always one)
5. Verify the powering off the EOIR camera. In the video window, Select the **OFF** button. Verify the response on the ISD[SRS0222-2][SRS0223-1]. ECM:EO_Power =0, ECM:IR_Power=0, ECM:EOIR_Payload_Active=0 ECM:EOIR_Payload_Camera_Select=0(outrider always one)
6. (no change for outrider) Verify the powering and selection for control of the EO-spot. In the video window, Select the **EO-spot** button. Verify the response on the ISD[SRS0222-1][SRS0223-2]. ECM:EO_Power =1, ECM:EOIR_Payload_Active=2
ECM:EOIR_Payload_Camera_Select=2(outrider always one)
7. Verify the powering off the EOIR camera. In the video window, Select the **OFF** button. Verify the response on the ISD[SRS0222-2][SRS0223-1]. ECM:EO_Power =0, ECM:IR_Power=0, ECM:EOIR_Payload_Active=0 ECM:EOIR_Payload_Camera_Select=0(outrider always one)
8. Verify the powering and selection for control of the IR. In the video window, Select the **IR** button. Verify the response on the ISD[SRS0222-1][SRS0223-2]. ECM:IR_Power =1, ECM:EOIR_Payload_Active=3 ECM:EOIR_Payload_Camera_Select=3(outrider always one)
9. Verify the powering off the EOIR camera. In the video window, Select the **OFF** button. Verify the response on the ISD[SRS0222-2][SRS0223-1]. ECM:EO_Power =0, ECM:IR_Power=0, ECM:EOIR_Payload_Active=0 ECM:EOIR_Payload_Camera_Select=0(outrider always one)
10. Verify the powering and selection for control of the EO-wide. In the video window, Select the **EO-wide** button. Verify the response on the ISD[SRS0222-1][SRS0223-2]. ECM:EO_Power =1, ECM:EOIR_Payload_Active=1 ECM:EOIR_Payload_Camera_Select=1(outrider always one)
11. Verify EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window [SRS0224-1]. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by selecting **CNTR**, then clicking in the map window. At the ISD verify EOIR_Pointer_Latitude,

EOIR_Pointer_Longitude, EOIR_Pointer_Altitude elements of the EOIR Command Message are set to the cursors' coordinates [SRS0225-1].

Cursor Coordinates (selected at the Map window)	Coordinates at the ISD

12. Ensure EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by selecting **CNTR**, then clicking in the video window. At the ISD verify EOIR_Pointer_Latitude, EOIR_Pointer_Longitude, EOIR_Pointer_Altitude elements of the EOIR Command Message are set to the cursors' coordinates [SRS0225-1].

Cursor Coordinates (selected at the Video window)	Coordinates at the ISD

13. Ensure EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by entering values at the keyboard. At the ISD verify EOIR_Pointer_Latitude, EOIR_Pointer_Longitude, EOIR_Pointer_Altitude elements of the EOIR Command Message are set to the cursors' coordinates [SRS0225] [SRS0225-2].

Enter Coordinates (in the Video window)	Coordinates at TCS (invalid) and ISD
LATITUDE	
35	35
-90	-90
-90:00:01	invalid
90	90
90:00:01	invalid
11:59:59	11:59:59
11:60:59	invalid
11:35:60	invalid
11:59:20	11:59:20
LONGITUDE	
111	111
180	180
180:00:01	invalid
-180	-180
-180:00:01	invalid
123:59:59	123:59:59
123:60:59	invalid
123:35:60	invalid
-123:59:59	-123:59:59

ALTITUDE	
3000	3000
-3000	-3000
-3001	invalid
10000	10000
10001	invalid
50	50

14. Ensure EOIR Pointing Reference Mode by selecting a pointing mode of Az/Depression. Verify the operator has the capability to set EOIR_AZIMUTH_AND_DEPRESSION (EOIR_Depression, EOIR_Azimuth) by entering values at the keyboard. [SRS0226-1] [SRS0226-2] [SRS0226-3]

Enter Coordinates (in the Video window)	Coordinates at TCS (invalid) and ISD
AZIMUTH	
0	0
30	30
135	135
200	200
300	300
360	invalid
359	359
-1	invalid
3	3
DEPRESSION	
-90	-90
-91	invalid
0	0
90	90
91	invalid
66	66

End of Section A.

Section B: The purpose of section B of the Payload Control test procedure is to ensure that the TCS can send payload control commands per the specification. States and modes are commanded at TCS and verification that the correct response is received by the actual HWCI and CSCI is performed. This is done with real TCS components in the loop.

1. Run the System setup procedure.
2. Start the DCM. Refer to the DCM Startup process sheet.
3. Verify the powering off the EOIR camera. In the video window, Select the **OFF** button. Verify the response in the video window the selected camera is **NONE**. [SRS0222-2][SRS0223-1]
4. Verify the powering and selection for control of the EO-wide. In the video window, Select the **EO-wide** button. Verify the response in the video window the selected camera is **EO** [SRS0222-2][SRS0223-1].
5. (no change for outrider) Verify the powering and selection for control of the EO-spot. In the video window, Select the **EO-spot** button. Verify the response in the video window the selected camera is **Spotter**[SRS0222-1][SRS0223-2]
6. Verify the powering and selection for control of the EO-wide. In the video window, Select the **IR** button. Verify the response in the video window the selected camera is **IR** [SRS0222-3][SRS0223-2]

7. Verify the powering off the EOIR camera. In the video window, Select the **OFF** button. Verify the response in the video window the selected camera is **NONE** [SRS0222-2][SRS0223-1]
8. Verify the powering and selection for control of the EO-wide. In the video window, Select the **EO-wide** button. Verify the response in the video window the selected camera is **EO**.
9. Verify EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window [SRS0224-1]. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by selecting **CNTR**, then clicking in the map window. At TCS verify EOIR_Pointer_Latitude, EOIR_Pointer_Longitude, EOIR_Pointer_Altitude EOIR_Payload_Pointing_Mode=0 elements of the EOIR Command Message are set to the cursors' coordinates [SRS0225-1].

Cursor Coordinates (selected at the map window)	Coordinates at TCS

10. Verify EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window[SRS0224-1]. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by selecting **CNTR**, then clicking in the video window. At TCS verify EOIR_Pointer_Latitude, EOIR_Pointer_Longitude, EOIR_Pointer_Altitude elements of the EOIR Command Message are set to the cursors' coordinates [SRS0225-1].

Cursor Coordinates (selected at the Video window)	Coordinates at TCS

11. Ensure EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by entering values at the keyboard. At TCS verify EOIR_Pointer_Latitude, EOIR_Pointer_Longitude, EOIR_Pointer_Altitude elements of the EOIR Command Message are set to the cursors' coordinates [SRS0225-1].

Cursor Coordinates (selected at the Video window)	Coordinates at TCS

12. Ensure EOIR Pointing Reference Mode by selecting a pointing mode of Az/Depression. Verify the operator has the capability to set EOIR_AZIMUTH_AND_DEPRESSION (EOIR_Depression, EOIR_Azimuth) by entering values at the keyboard. [SRS0226-1] [SRS0226-1]

Enter Coordinates (in the Video window)	Coordinates at TCS (invalid) and ISD
AZIMUTH	
DEPRESSION	

13. Ensure EOIR Pointing Fixed Mode by selecting a Pointing mode of **Coordinates** at the Video Window. Verify the operator has the capability to set EOIR_GROUND_POINT_COORDINATES latitude, longitude, and altitude by selecting **CNTR**, then clicking in the video window. Verify Latitude, Longitude, and Altitude at the DCM are set to the cursors' coordinates [SRS0127-1].

Cursor Coordinates (selected at the Video window)	Coordinates at DCM

14. Ensure EOIR Pointing Reference Mode by selecting a Pointing mode of **Az/Depression** at the Video Window. Set EOIR_AZIMUTH_AND_DEPRESSION (EOIR_Depression, EOIR_Azimuth) by entering values at the keyboard. Verify Latitude, Longitude, and Altitude at the DCM are set to the cursors' coordinates [SRS0127-1].

Enter Coordinates (in the Video window)	Coordinates at TCS (invalid) and ISD
AZIMUTH	
DEPRESSION	

2.8 Payload Status

The purpose of this Payload Status test procedure is to ensure that the TCS software can display EO and IR payload status per the TCS SRS. States and modes are entered at the ISD and receipt and displays of entered values are verified at TCS. Value displays will be examined in all TCS display windows.

Requirements included: SRS0238.

Steps:

PREDATOR MODE:

Verify the operator can monitor the EOIR_STATUS. [SRS0238-1] Set the following values for the EOIR Status Message at the ISD and verify the receipt of messages via status displays at TCS.

1. Power up the VCR, load a tape and push play.
2. On TCS Main, select the Video 1 shortcut button to open a video window.
3. Set the following values at the ISD and verify the display at the Video window.

Data element	Variable	Value	P/F
PL_Active_Sensor	None	0	
	Spotter	1	
	Wide Angle	2	
	IR	3	
PL_Pointer_Lat	-90		
	90		
	45.5		
	-35.75		
	75		
PL_Pointer_Lon	-180		
	180		
	90		
	55		
	-75		
PL_Azimuth_Angle	45		
	120		
	210		
	315		
PL_Depression_Angle	-90		
	65		
	25		
	100		
	120		

4. Set the following values at the ISD and capture a NITF image. Verify PL_Focal_Length in the Telemetry data is correct.

PL_Focal_Length	1.5		
-----------------	-----	--	--

	900		
	1800		
	3456		
	4567		

OUTRIDER MODE:

Verify the operator can monitor the EOIR_STATUS. [SRS0238-1] Set the following values for the EOIR Status Message at the ISD and verify the receipt of messages via status displays at TCS.

5. Power up the VCR, load a tape and push play.
6. On TCS Main, select the Video 1 shortcut button to open a video window.
7. Set the following values at the ISD and verify the display at the Video window.

Data element	Variable	Value	P/F
PL_Active_Sensor	None	0	
	EO	1	
	IR	2	
PL_Pointer_Lat	-90		
	90		
	45.5		
	-35.75		
	75		
PL_Pointer_Lon	-180		
	180		
	90		
	55		
	-75		
PL_Azimuth_Angle	45		
	120		
	210		
	315		
PL_Depression_Angle	-90		
	65		
	25		
	100		
	120		

8. Set the following values at the ISD and capture a NITF image. Verify PL_Focal_Length in the Telemetry data is correct.

PL_Focal_Length	1.5		
	900		
	1800		
	3456		
	4567		

2.9 APL Antenna Control

The purpose of the APL Antenna Control test procedure is to ensure that TCS communicates with the APL Antenna, which will be simulated by a PC. The communication takes place as a response to operator commands and data exchange throughout the system. The test procedure makes use of an APL antenna simulation program that emulates the APL Antenna hardware. The test consists of the transmission and reception of messages between TCS and APL antenna simulation. The commands are entered at TCS HCI, and the expected response is verified at the simulator. The response messages will be received from the APL antenna simulation and the expected results will be verified at TCS HCI.

Requirements: SRS0069, SRS 0070, SRS0079, SRS0127, SRS205, SRS0206, SRS0207, SRS0208, SRS0209, SRS0215.

Steps:

1. Perform System Setup Procedure.
2. Open the **Antenna Position** window. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Antenna Position** window appears. Annotate the data values that appear in the window:
3. Place antenna on default Location. On the **Antenna Position** window, left-click **Update Mode** and then left-click **Manual**. Fill the fields with the values presented below and click **OK**.

ANTENNA_POSITION	
Field	New Value
Update Mode	0.0
Position (Latitude)	0.0
Position (Longitude)	0.0
Altitude	0.0
Heading	0.0

4. Verify that the Antenna's location on map corresponds to the new location. Left-click on the map to superpose it over any other opened window. On the toolbar, left click on **Map Options**, and select **Whole World**. Locate antenna on map. Zoom in a few times on the antenna's icon. Place mouse's pointer over the antenna, and verify that the antenna is in default coordinates.
5. Perform APL ISD Setup Procedure. On the PC machine in which TAC-92 simulator is resident, double left-click on the application's shortcut. The **TAC-92Form** window appears.
6. Select the communication port. On TAC-92Form window, left-click the pull down menu **Configure**. Left-click on **COM Port**. The **Configure: COM Port** window appears.
7. On the **Configure: COM Port** window, select the **COM 2/B** option, and left-click **OK**. The communication is port is now set to two.
8. Select the **Data Set**. On TAC-92Form window, left-click the pull down menu **Configure**. Left-click on **Command Set....** The **Configure: Communications Interface** window appears.
9. On the **Configure: Communications Interface** window, select **User Interface Description Version 1.5B** option, and left-click **OK**. The Data Set for Version 1.5B is now selected.
10. Set AVSI ISD. On AVSI ISD, select the following variables:

AVSI's ISD	
Field	
ANT_Altitude	
ANT_Latitude	
ANT_Longitude	
ANT_Magnetic_Variation	
ANT_Platform_Heading	
AV_Altitude_Command	
AV_Latitude	
AV_Longitude	
AV_Speed_Command	

11. Set AV on at Antenna Lat/Lon. On AVSI ISD, set the following values as shown in the table:

AVSI's ISD	
Field	New Value
ANT_Altitude	0.0
ANT_Latitude	0.0
ANT_Longitude	0.0
ANT_Magnetic_Variation	0.0
ANT_Platform_Heading	0.0
AV_Altitude_Commands	1000
AV_Latitude	0.0
AV_Longitude	0.0
AV_Speed_Commands	0.1

12. Open the **Antenna Command** window. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Commands....** The **Antenna Commands** window appears.
13. On the **Antenna Commands** window, fill the fields as shown on the table with non default values, and click **APPLY**.

ANTENNA_COMMANDS	
Field	New Value
True Azimuth	30
Elevation	35
Designation	Flat plate
Frequency	High
Pointing Mode	Manual (as it is)
Auto Unwrap	On
Force Unwrap	Off (as it is)
Azimuth Offset	5.1

Elevation Offset	1.5
------------------	-----

14. Verify the antenna commands are transmitted to APL Antenna. On TAC-92 SIM, verify the following data [SRS0208-1]:

TAC-92 SIM			
Field	Correct Value	Incorrect Value	P/F
AZ	30		
EL	35		
REL	390		
POL	019		

15. Open the **Antenna Status** window. On TCS Main, left-click on pull down menu **Data Link**, and left-click on **Status....** The **Antenna Status** window appears.
16. Verify that TCS Monitors the APL Antenna Status, with the status resulting from the previous commands. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0208-1] [SRS0215-1] [SRS0205-1]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	30		
Range to AV	1000.0 ft		
Elevation	35		
True Azimuth	30		
Relative Azimuth	30 - 1.5		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Flat Plate		
Frequency	High		
Pointing Mode	Manual		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

17. On the **Antenna Commands** window, fill the fields as shown on the table with non default values, and click **APPLY**.

ANTENNA_COMMANDS	
Field	New Value

True Azimuth	46
Elevation	51
Designation	Flat plate
Frequency	Low
Command Mode	Manual (as it is)
Auto Unwrap	On
Force Unwrap	Off (as it is)
Azimuth Offset	10.1
Elevation Offset	3.4

18. Verify the antenna commands are transmitted to APL Antenna. On TAC-92 SIM, verify the following data [SRS0208-1]:

TAC-92 SIM			
Field	Correct Value	Incorrect Value	P/F
AZ	46		
EL	51		
REL	406		
POL	013		

19. Verify that TCS Monitors the APL Antenna Status, with the status resulting from the previous commands. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0208-1] [SRS0215-1] [SRS0205-1]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	46		
Range to AV	1000.0 ft		
Elevation	51		
True Azimuth	46		
Relative Azimuth	46 – 10.1		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Flat Plate		
Frequency	Low		
Pointing Mode	Manual		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

20. On the **Antenna Commands** window, fill the fields as shown on the table with non default values, and click **APPLY**.

ANTENNA_COMMANDS	
Field	New Value
True Azimuth	330
Elevation	89.99
Designation	Horn
Frequency	Low
Command Mode	Manual (as it is)
Auto Unwrap	On
Force Unwrap	Off (as it is)
Azimuth Offset	10.1
Elevation Offset	3.4

21. Verify the antenna commands are transmitted to APL Antenna. On TAC-92 SIM, verify the following data [SRS0208-2]:

TAC-92 SIM			
Field	Correct Value	Incorrect Value	P/F
AZ	330		
EL	89.99		
REL	330		
POL	000		

22. Verify that TCS Monitors the APL Antenna Status, with the status resulting from the previous commands. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0208-1] [SRS0215-1] [SRS0205-1]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	330		
Range to AV	1000.0 ft		
Elevation	89.99		
True Azimuth	330		
Relative Azimuth	330 - 10.1		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	Low		
Pointing Mode	Manual		
Unwrap in Progress	No		

Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

23. On the **Antenna Commands** window, fill the fields as shown on the table with non default values, and click **APPLY**.

ANTENNA_COMMANDS	
Field	New Value
True Azimuth	151
Elevation	0
Designation	Horn
Frequency	High
Command Mode	Manual (as it is)
Auto Unwrap	On
Force Unwrap	Off (as it is)
Azimuth Offset	0
Elevation Offset	0

24. Verify the antenna commands are transmitted to APL Antenna. On TAC-92 SIM, verify the following data [SRS0208-2]:

TAC-92 SIM			
Field	Correct Value	Incorrect Value	P/F
AZ	151		
EL	0		
REL	151		
POL	006		

25. Verify that TCS Monitors the APL Antenna Status, with the status resulting from the previous commands. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0208-1] [SRS0215-1] [SRS0205-1]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	151		
Range to AV	1000.0 ft		
Elevation	0		
True Azimuth	151		
Relative Azimuth	151		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		

Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Manual		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

26. Change the Command Mode to **Auto Tracking**. On the **Antenna Commands** window, change the Command Mode to Auto Tracking, and left-click **APPLY**.
27. Verify that the APL Antenna Controller has the value of the AV Position and the Antenna Position from previous steps, with the status window resulting from the auto tracking mode. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	0		
Range to AV	1000.0 ft		
Elevation	90		
True Azimuth	0		
Relative Azimuth	0		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

28. Change AV Position. On AVSI ISD, set the following values as shown in the table:

AVSI's ISD	
Field	New Value
AV_Latitude	2.5

AV_Longitude	2.5
--------------	-----

29. Verify the AV's new Position on the map. Superpose the map on any open window. Locate the AV on the map, and right click on it. On the AV Options, left-click **AV Status**. The **AV Status** window appears. Verify that the following table:

AV Status Window	
Field	Value
Air Speed	0.1
Altitude	1000
Position Latitude	02:30:00.0 N
Position Longitude	02:30:00.0 E
Heading	0
Pitch	0
Roll	0

30. Verify that TCS transmitted the new AV Position to the APL Antenna Controller, with the status resulting from the auto tracking mode and the AV's new position. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	44:58:21.7941		
Range to AV	1000.0 ft		
Elevation	00:02:39.8151		
True Azimuth	44:58:21.7941		
Relative Azimuth	44:58:21.7941		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

31. Change AV Position. On AVSI ISD, set the following values as shown in the table:

AVSI's ISD	
Field	New Value
AV_Latitude	-2.5
AV_Longitude	-2.5

32. Verify the AV's new Position on the map. Superpose the map on any open window. Locate the AV on the map, and right click on it. On the AV Options, left-click **AV Status**. The **AV Status** window appears. Verify that the following table:

AV Status Window	
Field	Value
Air Speed	0.1
Altitude	1000
Position Latitude	02:30:00.0 S
Position Longitude	02:30:00.0 W
Heading	0
Pitch	0
Roll	0

33. Verify that TCS transmitted the new AV Position to the APL Antenna Controller, with the status resulting from the auto tracking mode and the AV's new position. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	-135:01:38.2059		
Range to AV	1000.0 ft		
Elevation	00:05:19.6299		
True Azimuth	-135:01:38.2059		
Relative Azimuth	-135:01:38.2059		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

34. Change AV Position. On AVSI ISD, set the following values as shown in the table:

AVSI's ISD	
Field	New Value
AV_Latitude	3.11
AV_Longitude	3.11

35. Verify that TCS transmitted the new AV Position to the APL Antenna Controller, with the status resulting from the auto tracking mode and the AV's new position. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	22:58:04.1633		
Range to AV	203.0326		
Elevation	00:10:15.1239		
True Azimuth	22:58:04.1633		
Relative Azimuth	22:58:04.1633		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

36. Change AV Position. On AVSI ISD, set the following values as shown in the table:

AVSI's ISD	
Field	New Value
AV_Latitude	2.5
AV_Longitude	2.5

37. Verify that TCS transmitted the new AV Position to the APL Antenna Controller, with the status resulting from the auto tracking mode and the AV's new position. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	44:58:21.7941		
Range to AV	1000.0 ft		
Elevation	00:02:39.8151		
True Azimuth	44:58:21.7941		
Relative Azimuth	44:58:21.7941		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		
Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

38. Change AV Position. On AVSI ISD, set the **AV Altitude Command** value to 2000.
39. Open the **Antenna Position** window. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Antenna Position** window appears.
40. Change the **Antenna Position**. On the **Antenna Position** window, left-click **Update Mode** and then left-click **Manual**. Fill the fields with the values presented below and click **OK**.

ANTENNA_POSITION	
Field	New Value
Position (Latitude)	1.15
Position (Longitude)	1.89
Altitude	555.0
Heading	0.0

41. Verify the new **Antenna Position** through TCS main window. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Antenna Position** window appears. Verify the following table [SRS0069-1] [SRS0070-1]:

Antenna Position Window			
Field	Correct Value	Incorrect Value	P/F
Position Latitude	01:09:00.0 N		
Position Longitude	01:53:24.0 E		
Altitude	555.0		
Heading	0.0		

42. Verify that the **Antenna's location** on map corresponds to the new location. Left-click on the map to superpose it over any other opened window. On the toolbar, left click on **Map Options**, and select **Whole World**. Locate antenna on map. Zoom in a few times on the antenna icon. Place mouse's pointer over the center of the **Antenna**, and verify that the antenna is in the new location [SRS0079-1].

Pointers Coordinates on Map			
Field	Correct Value	Incorrect Value	P/F
Position Latitude	01:09:00.0 N		
Position Longitude	01:53:24.0 E		

43. Verify the **Antenna Position** through the Antenna Icon on the map. Place the mouse pointer on the antenna's icon, right-click on it, **Antenna Options** menu appears. Select **Setup...**, and the **Antenna Position** window appears.

44. Verify in the **Antenna Position** window the following data [SRS0069-1] [SRS0070-1] [SRS0079-1]:

Antenna Position Window			
Field	Correct Value	Incorrect Value	P/F
Position Latitude	01:09:00.0 N		
Position Longitude	01:53:24.0 E		
Altitude	555.0		
Heading	0.0		

45. Verify that TCS transmitted the new Antenna Position to the APL Antenna Controller, with the status resulting from the auto tracking mode and the Antenna's new position. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2][SRS0206-1]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	24:17:43.6328		
Range to AV	89.0315		
Elevation	00:12:42.5819		
True Azimuth	24:17:43.6328		
Relative Azimuth	24:17:43.6328		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		

Auto Unwrap	On		
Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

46. Verify TCS updates APL Antenna Position and transmits it to DCM. On AVSI ISD verify the following variables [SRS0209-1] [SRS0209-2][SRS0127-3]:

AVSI's ISD	
Field	New Value
ANT_Altitude	555
ANT_Latitude	1.15
ANT_Longitude	1.89
ANT_Magnetic_Variation	0.0
ANT_Platform_Heading	0.0

47. Change the **Antenna Position**. On the **Antenna Position** window, left-click **Update Mode** and then left-click **Manual**. Fill the fields with the values presented below and click **APPLY**.

ANTENNA_POSITION	
Field	New Value
Altitude	555
Position (Latitude)	3.15
Position (Longitude)	3.89
Heading	0.0

48. Verify the new **Antenna Position** through TCS main window. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Antenna Position** window appears. Verify the following table [SRS0069-1] [SRS0070-1]:

Antenna Position Window			
Field	Correct Value	Incorrect Value	P/F
Position Latitude	03:09:00.0 N		
Position Longitude	03:53:24.0 E		
Altitude	555.0		
Heading	0.0		

49. Verify that the **Antenna's location** on map corresponds to the new location. Left-click on the map to superpose it over any other opened window. On the toolbar, left click on **Map Options**, and select **Whole World**. Locate antenna on map. Zoom in a few times on the antenna icon. Place mouse's pointer over the center of the **Antenna**, and verify that the antenna is in the new location [SRS0079-1].

Pointers Coordinates on Map			
Field	Correct Value	Incorrect Value	P/F
Position Latitude	03:09:00.0 N		
Position Longitude	03:53:24.0 E		

50. Verify the **Antenna Position** through the Antenna Icon on the map. Place the mouse pointer on the antenna's icon, right-click on it, **Antenna Options** menu appears. Select **Setup...**, and the **Antenna Position** window appears.

51. Verify in the **Antenna Position** window the following data [SRS0069-1] [SRS0070-1] [SRS0079-1]:

Antenna Position Window			
Field	Correct Value	Incorrect Value	P/F
Position Latitude	03:09:00.0 N		
Position Longitude	03:53:24.0 E		
Altitude	555.0		
Heading	0.0		

52. Verify the new **Antenna Position**. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Antenna Position** window appears. Verify the following table:

Antenna Position Window	
Field	Value
Altitude	555
Position Latitude	03:09:00.0 N
Position Longitude	03:53:24.0 E

53. Verify that TCS transmitted the new Antenna Position to the APL Antenna Controller, with the status resulting from the auto tracking mode and the Antenna's new position. On the Antenna Status window verify the following table (15 seconds after antenna command) [SRS0207-1] [SRS0207-2][SRS0206-1]:

ANTENNA_STATUS			
Field	Correct Value	Incorrect Value	P/F
True Bearing to AV	115:04:58.6293		
Range to AV	92.1627		
Elevation	00:12:42.5819		
True Azimuth	115:04:58.6293		
Relative Azimuth	115:04:58.6293		
Near Lower Azimuth Level	No		
Near Upper Azimuth Level	No		
Pedestal Temperature	Not tested	N/A	N/A
Designation	Horn		
Frequency	High		
Pointing Mode	Auto Tracking		
Unwrap in Progress	No		
Auto Unwrap	On		

Initialization	No		
Error Detected	No		
Stabilizing Mode	Software		

54. Verify TCS updates APL Antenna Position and transmits it to DCM. On AVSI ISD verify the following variables [SRS0209-1] [SRS0209-2][SRS0127-3]:

AVSI's ISD	
Field	New Value
ANT_Altitude	555
ANT_Latitude	3.15
ANT_Longitude	3.89
ANT_Magnetic_Variation	0.0
ANT_Platform_Heading	0.0

Fields Verification for Antenna Position Window:

55. Verify that the Antenna Position window rejects values outside its range. Open the Antenna Position window. On TCS Main, left-click on pull down menu **Data Link**, left-click on **Set Up**. The **Antenna Position** window appears.
56. On the **Antenna Position** window, left-click **Update Mode** and then left-click **Manual**. Enter values "Just Above, Just Below, and Equal To" one at a time for each item in the antenna position data window [SRS070-2].

Antenna Position Fields				
Field	Range	Correct Value	Result	P/F
Altitude	-2000 <= X <= 2000	-2001	Invalid	
		-2000	Valid	
		0	Valid	
		2000	Valid	
		2001	Invalid	
COORDINATES UTM	Zone -60 to +60 not 0 N??????? E???????	Z+31 N0000000 E166021 Z+00 N0123456 E654321 Z+01 N0123456 E654321 Z-00 N0123456 E654321 Z-01 N0123456 E654321 Z+61 N0123456 E654321 Z+60 N0123456 E654321 Z-61 N0123456 E654321 Z-60 N0123456 E654321 Z+21 N0000000 E000000 Z+21 N9999999 E999999 Z+21 Na000000 E999999 Z+31 N0000000 Ea99999 Z+31 N0000000 E166021	Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Valid Valid Valid Valid Valid Valid Valid Valid Valid Valid Valid	

COORDINATES Lat/Lon	Lat 00-00-00 to 89-59-59 (N/S)	00-00-00N 000-00-00E	Valid	
	Lon 000-00-00 to 179-59-59 (E/W)	90-00-00N 000-00-00E 00-00-00S 000-00-00W 90-00-00S 000-00-00E 89-59-59N 179-59-59E 00-60-00N 000-00-00E 00-00-00N 000-00-00E 00-00-60N 000-00-00E 00-00-00N 000-00-00E 00-00-00N 180-00-00E 00-00-00N 000-00-00E 00-00-00N 000-60-00E 00-00-00N 000-00-00E 00-00-00N 000-00-60E 89-59-59S 179-59-59W 00-06-00S 000-00-00W 00-00-00S 000-00-00W 00-00-60S 000-00-00W 00-00-00S 000-00-00W 00-00-00S 180-00-00W 00-00-00S 000-00-00W 00-00-00S 000-60-00W 00-00-00S 000-00-00W 00-00-00S 000-00-60W 00-00-00N 000-00-00E	Invalid Valid Invalid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Invalid Valid Valid Invalid Valid Invalid	
Latitude	90 <= X <=90	-91	Invalid	
		-90	Valid	
		-89.23	Valid	
		0	Valid	
		89.23	Valid	
		90	Valid	
		91	Invalid	
Longitude	-180 <= X <=180	-181	Invalid	
		-180	Valid	
		-179.23	Valid	
		0	Valid	
		179.23	Valid	
		180	Valid	
		181	Invalid	
Magnetic Variation	-90 <= X <=90	-91	Invalid	
		-90	Valid	
		-89.23	Valid	
		0	Valid	
		89.23	Valid	
		90	Valid	
		91	Invalid	
Platform Heading	0<= X <=360	-1	Invalid	
		0	Valid	
		0.05	Valid	
		90	Valid	
		180	Valid	
		270	Valid	
		330	Valid	

		359	Valid	
		360	Valid	
		361	Invalid	

57. Locate the Antenna icon on the map. Click on the map to superpose it over any other opened window. On the toolbar, left click on **Map Options**, and select **Whole World**. Locate antenna on map. Zoom in several times on the antenna's icon. Place mouse's pointer over the antenna.
58. Open the Commands window. With the mouse-pointer over the antenna icon, right-click on it. Select **Antenna Command**. The **Antenna Command** window appears.
59. Verify that the Antenna Commands window rejects values outside its range. Fill the fields with the values presented below, and verify whether the value is rejected or accepted:

Field	Range	Correct Value	Result	P/F
True Azimuth	$0 \leq X \leq 360$	-1	rejected	
		-0	accepted	
		0.23	accepted	
		180	accepted	
		359.23	accepted	
		360	accepted	
		361	rejected	
Elevation	$0 \leq X \leq 360$	-11	rejected	
		-10	Valid	
		0.23	Valid	
		45	Valid	
		89.23	Valid	
		90	Valid	
		91	Invalid	
Azimuth Offset	$-180 \leq X \leq 180$	-181	Invalid	
		-180	Valid	
		-179.23	Valid	
		-90	Valid	
		-45.23	Valid	
		0	Valid	
		45.23	Valid	
		90.33	Valid	
		179.23	Valid	
		180	Valid	
		181	Invalid	
Elevation Offset	$-180 \leq X \leq 180$	-181	Invalid	
		-180	Valid	
		-179.23	Valid	
		-90	Valid	
		-45.23	Valid	
		0	Valid	
		45.23	Valid	
		90.33	Valid	
		179.23	Valid	
		180	Valid	
		181	Invalid	

Pan Antenna icon off/on the map.

60. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll until the Antenna is off the Map Display.
61. Verify the Antenna icon is no longer displayed on the Map and Antenna position and text is unchanged [SRS0079-2].
62. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll until the Antenna is back on the Map Display
63. Verify the Antenna icon is displayed on the Map and AV position and text is unchanged [SRS0079-3].
64. Close **Antenna Command** window. On the **Antenna Command** window, left-click **OK**.
65. Close the **Antenna Status** window. On the **Antenna Status** window, left-click **OK**.
66. Close the **Antenna Position** window. On the **Antenna Position** window, left click **OK**.
- 67.

2.10 Default State Data

The purpose of the Default State Data test procedure is to ensure that specified default values stated in the SRS have been implemented in the software design. Operator entry and display windows will be examined during this test procedure.

Requirements: SRS0002, SRS0062, SRS0101, and SRS0114

Steps:

1. Do not initialize ISD. Do not run System Setup Procedure.
2. Initialize TCS to an operational state of readiness. TCS must be reloaded for this procedure.
3. Load TCS by selecting **TCS** then **TCS Main** from the pulldown menu.
4. Ensure TCS is loaded into memory.
5. Select **Datalink**, then **Setup** from the TCS pulldown menu. Observe default values in the Antenna window. Verify the Antenna default entry items are displayed [SRS0002-1].

Field	TCS Defaults	Pass	Fail
Update Mode	Auto		
Latitude	0.0		
Longitude	0.0		
Altitude	0.0		
Heading	0.0		

6. Select **Cancel** to close the Antenna Position window.
7. Select **Datalink**, then **Commands** from the pulldown window. Observe the default values in the Antenna Commands window. Verify the Antenna Commands entry items are displayed.

Field	TCS Defaults	Pass	Fail
True Azimuth	0.0		
Elevation	0.0		
Designation	Horn		
Frequency	Low		
Pointing Mode	Manual		
Auto Unwrap	Off		
Force Unwrap	Off		
Azimuth Offset	0.0		
Elevation Offset	0.0		

8. Select **Cancel** to close the antenna commands window.
9. Select **Datalink**, then **Status** from the pulldown window. Observe the default values in the Antenna Status window. Verify the Antenna Status items are displayed.

Field	TCS Defaults	Pass	Fail
True Bearing to AV	0.0		
Range to AV	0.0		
Elevation	0.0		
True Azimuth	0.0		

Relative Azimuth	0.0		
Near Lower Azimuth Limit	NO		
Near Upper Azimuth Limit	NO		
Pedestal Temperature	73.4		
Designation	HORN		
Frequency	LOW		
Pointing Mode	MANUAL		
Unwrap in Progress	NO		
Auto Unwrap	OFF		
Initializing	NO		
Error Detected	NO		
Stabilization Mode	SOFTWARE		

10. Select **Datalink** then **Status** to close the Antenna Status window.
11. Power up the VCR, load tape and push play.
12. At the TCS console, select **Output #1 ...** button. Ensure RS-170 NTSC video is displayed in Output window 1 with pointer cross hairs.
13. Verify current time is displayed [SRS0114-1].
14. Ensure Center FOV: is 00-00-00N 000-00-00E in the Output 1 window.
15. Capture a video frame by selecting **Capture** from the toolbar.
16. View the resulting image via the DII/COE functionality. On DII, left-click on **Intel** pull down menu, and left-click on **Image Composition Tool v2.3**. The **Image Composition** window appears.
17. Load the file to view. Left-click on **File**, and then left-click on **Load (File System)**. The **File Selection** window appears. Select the directory. Move from **/h/data/local/NITFS/tmp/** to **/h/TCS/data/video_frames/**.
18. Using the scroll bar, look for the last file that contains the NITF extension. Select it, and **OK**.
19. The Captured image must appear on **Image Composition** window. Ensure that the capture image is the same as the on the video monitor.
20. On the **File Selection** window, select the file with the extension **txt**, and press **OK**.
21. Verify the AV_EOIR_TELEMETRY default data in the NITF text file matches the following table [SRS002-3].

Title	SRS Values	TCS Display value if different	Pass	Fail
AV_Airspeed	0.0			
AV_Baro_Altitude	0.0			
AV_Climb_Rate	0.0			
AV_Current_Nav_Position_Source	INS			
AV_GPS_Time_Second	0			
AV_GPS_Time_Week	0			
AV_Ground_Track	0.0			
AV_Heading	0.0			

Title	SRS Values	TCS Display value if different	Pass	Fail
AV_INS_Altitude_Acceleration	0.0			
AV_Latitude	0.0			
AV_Longitude	0.0			
AV_Next_Waypoint	0			
AV_Pitch	0.0			
AV_Roll	0.0			
AV_Tail_Number	UAV000			
AV_Yaw_Rate	1			
Mission_ID	1			
PL_Active_Sensor	None			
PL_Azimuth_Angle	0.0			
PL_Depression_Angle	0.0			
PL_Center_Point_Lat	0.0			
PL_Center_Point_Lon	0.0			
PL_Focal_Length	1.0			
PL_FOV_Horizontal	1.0			
PL_FOV_Vertical	1.0			
PL_LOS_Range_To_Target	0.0			
PL_Pointing_Mode	Azimuth/Elevation			

22. Close the **Telemetry Data** window. On the Telemetry data window, press **OK**.
23. On the **Image Composition Tool V2.3**, press **OK**. Ensure that the NITF image display is removed from the screen.
24. Select **Comms**, then **Tac Msg...** from the pulldown menu. Ensure the Tactical Communication window is displayed. Verify the RECCEXREP Default entry items are displayed [SRS0002-5] [SRS0101-1].

RECCEXREP	TCS Defaults	Pass	Fail
Email Dest	(blank)		
Msg_Precedence	ROUTINE		
Msg_Class	UNCLASSIFIED		
Name:(Ex/Op)	(blank)		
Name:(supp)	(blank)		

25. Observe the default values for GPS_TIME. Open Video output window 1 and observe the default value of 0.0 [SRS002-6] (time 06000Z).

Field	TCS Defaults	Pass	Fail
GMT_Day	00		
GMT_Hr	00		
GMT_Min	00		
GMT_Month	00		
GMT_Sec	00		
GMT_Year	00		

26. On TCS, select the entered mission, and left-click on **Select**. **TCS Position** window appears.

27. Place TCS on default location. On **TCS Position** window, left-click **OK**.
28. Place the antenna position on Default location. On TCS Main, hit pull down menu **Datalink**, then select **Setup**, and **Antenna Position** window appears.
29. On **Antenna Position** window, hit the pull right menu **Mode**, and then select **Manual**. Fill the Lat and Lon coordinates with 0 values and hit **OK**:

Antenna Position Window	
Field	Value
Altitude	0
Latitude	0
Longitude	0

30. On TCS Main, hit the **Video1** short cut button. Output1 window opens. Verify that the overlay corresponds to the default output values. [SRS0062-2]:

Payload Status Message			
Output1 Displayed Field	Output1 Expected Values	Output1 Displayed Values if different	P/F
Center FOV Slant Range	0		
Center FOV Lat	0		
Center FOV Lon	0		
LOS Incidence Angle	0		
LOS True Azimuth Angle	0		
Time	0:0:0		
Date	Jan 6, 1980		
PL_Active_Sensor	None		
PL_Focal_Lenth	0		
PL_Depression	0		
AV_Tail_Number	UAV000		
CFOV Lat	00:00		
CFOV Lon	00:00		

31. Turn Output1 off. On TCS Main, left-click on Video1 short cut button, Output1 disappears.

2.11 Shutdown Processing

The purpose of the Shutdown Processing test procedure is to ensure that the software shuts down TCS processes when commanded. The procedure examines abnormal shutdown events and ensures that TCS can be restarted without manually stopping TCS processes.

Requirements: SRS0004

Steps:

1. Perform System Setup Procedure.
2. In the TCS window, select **EXIT** button in the TCS window. Ensure the Question window is displayed., then select **YES** from the list. Verify TCS is shutdown [SRS0004-1].
3. Ensure that all of the TCS element are shutdown by opening a xterm window (TCS, TCS Xterm) and entering. Perform this action on the Workstation, VME UX board, and VME RT Board.
ps -fu <loginname>
4. Restart TCS from System Setup Procedure .

Note: The AV Tail Number needs to match for ISD, TCS, Route/Payload Planner .

Shutdown with load on the system.

5. Ensure the AV Icon is displayed on the map. (AV position may be changed with ISD)
6. Put the pointer on the AV Icon, depress the **right track ball** button. Ensure the <Tail #> Option window is displayed. In the <Tail #> Option window, select **Status** menu item, ensure the AV Status is displayed.
7. At ISD console, set AV speed such that Lat/Lon change on TCS frequently.
8. Power up the VCRs, load tapes and push play.
9. Open all TCS windows controlled by the TCS window. and enter some data.
10. In the TCS window, select **EXIT** button in the TCS window. Ensure the Question window is displayed., then select **YES** from the list. Verify TCS is shutdown [SRS0004-2].
11. Ensure that all of the TCS element are shutdown by opening a xterm window (TCS, TCS Xterm) and entering. Perform this action on the Workstation, VME UX board, and VME RT Board.
ps -fu <loginname>
12. Restart TCS from System Setup Procedure .

Abnormal process termination.

13. Ensure that TCS can recover from abnormal termination of main TCS processes. Open a terminal window, find the wanted process number by entering **ps -fu tcs**, then enter **kill -9 <the process #>**. The processes will be on the Workstation, VME UX board, and VME RT Board. Kill one of the process listed below record the result in the log notes. Try to exit TCS using the Exit button in the TCS window. If this does not work, then try to restart TCS using the DII/COE TCS menu. (Note it may take some time for the TCS main.. menu item to become active again.) If this does not work, logout and re-login, then try to restart TCS. If this does not work, kill the **tcs_main** process then try to restart TCS using the DII/COE TCS menu. (Note it may take some time for

TCS main menu item to become active again.) If this does not work, kill all TCS related process manually then restart TCS. (Note: The STR for abnormal termination has not been closed.)

Process to be Killed

```
h/TCS/bin/tcs_main
h/TCS/bin/ge
geif_driver
h/TCS/bin/vicap
tcs_cntl.cfg
ch
tcs_cnfl
tcs_mds
tcs_ds_ifdriver
/h/TCS/bin/mds_ctl
/h/TCS/bin/tcs_acm
/h/TCS/bin/rtp_exec
/h/TCS/bin/avsif
/h/TCS/bin/apsc
```

Process terminated by logging off

14. Shutdown TCS. In the TCS window, select **EXIT** button in the TCS window. Ensure the Question window is displayed., then select **YES** from the list. Note: This step may not be necessary depending on what was killed. IE, the TCS main window may not be present.
15. If the Route/Payload Planner is up, then shut it down. Select **File** in planner window, select **Quit** in the menu, then answer **Yes** to the conformation question.
16. Logoff the system.
17. Perform System Setup Procedure
18. Power up the VCRs, load tapes and push play.
19. Open an existing Route/Payload Plan file, by selecting **Open Route** from the Route/Payload Planner File pull down menu.
20. Select an existing Route/Payload Planner with the filename _____ by highlighting it and clicking **OK**. The Route/Payload Plan will be displayed in the main window.

Change Route/Payload Parameters.
21. Select **Edit Mission Parameters** from the **Edit** pull down menu, this will display the Edit Mission Parameters dialogue box. Change the AV type and AV ID fields to match those assigned in the TCS ISD setup. Click **OK** to apply the changes.
22. Save the Route/Payload as _____, by selecting **Save Route As** from the File pull down menu. Enter the new filename in the data entry field. Click **OK** to save the file. [SRS0074-1]
23. Select **Route** from the **Router** pulldown menu and run **Flight Simulation** on the route. Select **FVR** from **Router** pull down menu and click **OK** in response to the next two dialogue boxes

24. To send the Route/Payload Planner file to the DCM, Select **Upload Route to UAV** function from the **Tools** pull down menu. A successful upload will display the Validity Check Status display window, informing the user that the Route/Payload has been uploaded.
25. Ensure that Route/Payload Plan is flown, and that the AV icon follows the route/payload plan.
26. Open some TCS windows controlled by the TCS window.
27. Open some of the Route/Payload Planner windows.
28. Logoff the system.
29. Logon the system.
30. Ensure that all of the TCS element are shutdown by opening a xterm window (TCS, TCS Xterm) and entering. Perform this action on the Workstation, VME UX board, and VME RT Board.
ps -fu <loginname>
31. Restart TCS from System Setup Procedure . Ensure the system launched and is operational.

2.12 ODCM Integration

The purpose of the Outrider DCM Integration test procedure is to ensure that ODCM to TCS downlink messages are in accordance with the TCS to AV Standard Interface. The uplink messages are being tested in the performance test procedures dealing with control. There are sections in these tests that will test uplink DCM integration. The avsif process error output files will be examined. This file will contain a record of the downlink data elements that were received by TCS that did not comply with the AV Standard Interface. The software performing the checking is tested in the Telemetry test procedure. The mission plan upload to the DCM will be tested in this procedure.

Requirements: Not Applicable

Steps:

1. Start the DCM. Refer to the DCM startup procedure.
2. Ensure the DCM IP address is in the hosts file.
3. Ensure the tcs_main.ini file has the port, host, version, and AV type set for the DCM.
4. Run the System setup procedure without starting up the ISD.
5. Open a terminal window on the RT processor
6. In the terminal window, monitor the error file of the avsif process.
Enter
cd /h/TCS/data
tail -f avsif.### or more avsif.###
7. Using the controls on the DCM, change the STATES and MODES per the AV Standard Interface.
8. Using the controls on the DCM, cycle the continuous elements per the AV Standard Interface
9. Messages to be examine are AV EO/IR Status Message, AV Position Status Message, AV Fuel Status Message, and AV INS Status Message.
10. Shutdown the DCM
11. Restart the DCM. Refer to the DCM startup procedure. Ensure TCS updates the displays when the interface with the DCM is re-established.

Upload a route to the Outrider DCM.

12. Create or Open a previously used route.
13. Select **Edit Mission Parameters** from the Edit pull down menu, this will display the Edit Mission Parameters dialogue box. Change the AV type and AV ID fields to match those of the ODCM. Click **OK** to apply the changes.
14. Save the Route/Payload as <mptest1>, by selecting **Save Route As** from the File pull down menu. Enter the new filename in the data entry field. Click **OK** to save the file. [SRS0074-1]
15. Select **FVR** from Router pull down menu, click **OK** in response to the next two dialogue boxes
16. Send the Route/Payload Planner file to the DCM; Select **Upload Route to UAV** function from the Tools pull down menu. A successful upload will display a notification window, informing the user

that the Route/Payload has been uploaded.

17. Verify the AV flies the route.

2.13 PDCM Integration

The purpose of the Predator DCM Integration test procedure is to ensure that PDCM to TCS downlink messages are in accordance with the TCS to AV Standard Interface. The uplink messages are being tested in the performance test procedures dealing with control. There are sections in these tests that will test uplink DCM integration. The avsif process error output files will be examined. This file will contain a record of the downlink data elements that were received by TCS that did not comply with the AV Standard Interface. The software performing the checking is tested in the Telemetry test procedure. The mission plan upload to the DCM will be tested in this procedure.

Requirements: Not Applicable

Steps:

1. Start the DCM. Refer to the DCM startup procedure.
2. Ensure the DCM IP address is in the hosts file.
3. Ensure the tcs_main.ini file has the port, host, version, and AV type set for the DCM.
4. Run the System setup procedure without starting up the ISD.
13. Open a terminal window on the RT processor
14. In the terminal window, monitor the error file of the avsif process.
Enter
cd /h/TCS/data
tail -f avsif.### or more avsif.###
15. Using the controls on the DCM, change the STATES and MODES per the AV Standard Interface.
16. Using the controls on the DCM, cycle the continuous elements per the AV Standard Interface
17. Messages to be examine are AV EO/IR Status Message, AV Position Status Message, AV Fuel Status Message, and AV INS Status Message.
18. Shutdown the DCM
19. Restart the DCM. Refer to the DCM startup procedure. Ensure TCS updates the displays when the interface with the DCM is re-established.

Upload a route to the Predator DCM.

20. Create or Open a previously used route.
13. Select **Edit Mission Parameters** from the Edit pull down menu, this will display the Edit Mission Parameters dialogue box. Change the AV type and AV ID fields to match those of the PDCM. Click **OK** to apply the changes.
14. Save the Route/Payload as <mptest1>, by selecting **Save Route As** from the File pull down menu. Enter the new filename in the data entry field. Click **OK** to save the file. [SRS0074-1]
15. Select **FVR** from Router pull down menu, click **OK** in response to the next two dialogue boxes
16. Send the Route/Payload Planner file to the DCM; Select **Upload Route to UAV** function from the Tools pull down menu. A successful upload will display a notification window, informing the user

that the Route/Payload has been uploaded.

17. Verify the AV flies the route.

2.14 SAR Processing

The purpose of the SAR Processing test procedure is to ensure that the TCS to SAR processor interface is in accordance with the TCS to SAR Processor IDD. The SAR imagery display processing and NITF image capturing and transmission from SAR to TCS will be viewed in the test procedure. In this test procedure, the captured SAR NITF image and associated data will be viewed on the TCS workstation. The SAR captured NITF file will be transmitted using NSF and FTP. This test will only be executed for Predator AV type.

Requirements: SRS0005, SRS0057 and SRS0058.

Steps:

1. Perform the System Setup Procedure
2. Open a xterm window from the tool bar to start to the SAR Processor by selecting **TCS, TCS Xterm** from the DII/COE pulldown menu.
3. Ensure that the SAR Processor system is up and operational.
4. In the xterm window, change to the startup script directory and enter
setenv TCS_HOME /h/TCS
5. In the xterm window, run startup script for the SAR Processor by entering **startup**.
6. In the _____ window, select the host name for Xwindows to give SAR display permissions, then depress the **SELECT** button.
7. In the startup_t window, depress the **START XFER** button.
8. In the startup_t window, depress the **START DISPLAY** button. Verify TCS can launch the SAR Processor program and verify display the SAR imagery in waterfall mode.[SRS0057-1] [SRS0057-2]
9. Terminate display the SAR imagery in waterfall mode. In the SAR menus, select **Quit**, then in the QuitAppConfirm_popup window, select **Yes**.
10. In the startup_t window, depress the **START DISPLAY** button. Ensure display the SAR imagery in waterfall mode.
11. Display the SAR imagery in mosaic mode. In the SAR menus, select Options, then from the list, select **Scroll Method**, then select **Image Scroll**. Verify the TCS ability to use SAR Processor functionality (steps 11- 22) [SRS0058-1]
12. Lower the SAR image display.
13. Minimize the SAR image.
14. Restore the icon SAR imagery, select the ISD icon.
15. Capture SAR NITF file. Move the pointer on the SAR imagery and depress the **left track ball** button.
16. View the resulting image via the DII/COE functionality. On DII, left-click on **Intel** pull down menu, and left-click on **Image Composition Tool v2.3**. The **Image Composition** window appears.

17. Load the file to view. Left-click on **File**, and then left-click on **Load (File System)**. The **File Selection** window appears. Select the directory. Move from **/h/data/local/NITFS/tmp/** to **/h/TCS/data/video_frames/**.
18. Using the scroll bar, look for the last file that contains the NITF extension. Select it, and **OK**.
19. The Captured image must appear on **Image Composition** window. Verify that the capture image is the same as the one on the video monitor. [SRS0005-1]
20. Check the Telemetry data. On the **IMAGE COMPOSITION TOOL V2.3**, left click on **EDIT**. The **Text Header** window opens.
21. ON the **File Selection** window, select the file with the extension **txt**, and press **OK**.
22. Verify the NITF file has the components specified in the IDD and SRS.

SAR Image Auxiliary Data File

AV_SAR_TELEMETRY VARIABLE	DATA ITEM DESCRIPTION	RANGE ACROSS EXTERNAL INTERFACE	FIELD NBR
AV_Tail_Nbr	UAV Tail Number/ID	1 to 127	1
AV_Lat_Deg	UAV Latitude	-90.0 to +90.0 degrees	2
AV_Lon_Deg	UAV Longitude	-180.0 to +180.0 degrees	3
AV_True_Heading	UAV Heading, True North from magnetometer	0 to 359.9 degrees	4
AV_Alt_Ft_Msl	UAV Altitude, mean above sea level from barometric pressure	-3,000 to 60,000 feet	5
Mission_ID_Nbr	Mission ID Number	0 to 255 (0 = PPO Modified Mission)	6
SAR_Image_Time	Time of Image	GMT, 00:00:00 to 23:59:59	7
SAR_Image_Date	Date of Image	GMT, dd MMM yy	8
SAR_ID	Sensor ID		9
SAR_Image_Azimuth	Scene Azimuth, center point, (ref. to true north)	0 to 359.9 degrees	10
SAR_Illumination_Angle	Scene Illumination Angle (direction of radiation)		11
SAR_Depression_Angle	Sensor Depression Angle (relative to horizon)	-90.0 to 120.0 degrees (below horizon is negative)	12
SAR_Slant_Range	Slant Range to Target	0 to 999999 ft	13

AV_SAR_TELEMETRY VARIABLE	DATA ITEM DESCRIPTION	RANGE ACROSS EXTERNAL INTERFACE	FIELD NBR
SAR_Image_Baseline_Length	Image Baseline Length (width of image at scene center line)	0 to 99999 ft	14
SAR_Sensor_Mode	SAR Sensor Mode		15
SAR_Center_Pt_Lat	Latitude of scene center point	-90.0 to +90.0 degrees	16
SAR_Center_Pt_Long	Longitude of scene center point	-180.0 to +180.0 degrees	17
SAR_LT_Pt_Lat	Latitude of scene left top corner	-90.0 to +90.0 degrees	18
SAR_LT_Pt_Long	Longitude of scene left top corner	-180.0 to +180.0 degrees	19
SAR_RT_Pt_Lat	Latitude of scene right top corner	-90.0 to +90.0 degrees	20
SAR_RT_Pt_Long	Longitude of scene right top corner	-180.0 to +180.0 degrees	21
SAR_RB_Pt_Lat	Latitude of scene right bottom corner	-90.0 to +90.0 degrees	22
SAR_RB_Pt_Long	Longitude of scene right bottom corner	-180.0 to +180.0 degrees	23
SAR_LB_Pt_Lat	Latitude of scene left bottom corner	-90.0 to +90.0 degrees	24
SAR_LB_Pt_Long	Longitude of scene left bottom corner	-180.0 to +180.0 degrees	25

23. Close the **Telemetry Data** window. On the Telemetry data window, press **OK**.
24. On the **Image Composition Tool V2.3**, press **OK**. Ensure that the NITF image display is removed from the screen.
25. Ensure the transmission of NITF messages using NFS to PTW. Use the PTW procedure to power up and display the NITF image.
26. Capture SAR full resolution chip display. Move the pointer on the SAR imagery and depress the **center track ball** button
27. Select SAR resolution of 1 to 1 centered. From the SAR menus, select **Options**, then from the list, select **Resolution**, then select **1 to 1 Centered**.
28. Select SAR resolution of 4 to 1. From the SAR menus, select **Options**, then from the list, select **Resolution**, then select **4 to 1**.

29. Capture SAR NITF file. Move the pointer on the SAR imagery and depress the **left track ball** button.
30. Terminate display the SAR imagery. In the SAR menus, select **Quit**, then in the QuitAppConfirm_popup window, select **Yes**.
31. In the startup_t window, depress the **QUIT** button.
32. Close the terminal window.

2.15 RPP Integration

The purpose of the RPP Integration test procedure is to ensure that created mission plans can be transmitted and that the TCS data server can send antenna position and telemetry data to the mission planner. This test will be run with a simulator. The sending of a route/payload plan to a DCM will be done in the Air Vehicle DCM Integration tests.

Requirements: SRS0071, SRS0072, SRS0073, SRS0074, and SRS0075.

Steps:

Note:

Test procedure can be made to run more quickly and efficiently by increasing the AV speed and AV turn angle on the ISD.

1. Perform System Setup procedure.
2. Open an existing Route/Payload Plan , by selecting **Open Route** from the Route/Payload Planner File pull down menu.
3. Select an existing Route/Payload Planner with the filename <CRH2> by highlighting it and clicking **OK**. The Route/Payload Plan will be displayed in the main window.
Change Route/Payload Parameters.
4. Select **Edit Mission Parameters** from the Edit pull down menu, this will display the Edit Mission Parameters dialogue box. Change the AV type and AV ID fields to match those assigned in the TCS ISD setup. Click **OK** to apply the changes.
5. Save the Route/Payload as <mptest1>, by selecting **Save Route As** from the File pull down menu. Enter the new filename in the data entry field. Click **OK** to save the file. [SRS0074-1]

Upload Route/Payload Planner file to ISD

6. Select **FVR** from Router pull down menu, click **OK** in response to the next two dialogue boxes
7. To send the Route/Payload Planner file to the ISD, Select **Upload Route to UAV** function from the Tools pull down menu. A successful upload will display the Validity Check Status display window, informing the user that the Route/Payload has been uploaded. [SRS0075-1]
8. Verify that Route/Payload Plan is flown, and that the AV icon follows the route/payload plan so that Route/Payload progress can be observed.

On Completion of Route/Payload, restore previous Route/Payload Plan file and upload again to TCS

9. To restore the previous Route/Payload Plan, select **Open Route** from File pull down menu. Highlight the file <mptest1>, and click **OK**.
10. Select FVR to from the Router pulldown menu, and click OK in response to the next two dialog boxes.
11. Send the Route/Payload Planner file to the ISD; Select **Upload Route to UAV** function from the Tools pull down menu. A successful upload will display the Validity Check Status display window, informing the user that the Route/Payload has been uploaded.

Retasking the AV.

12. While AV Route is being flown, modify the current Route/Payload plan by deleting a waypoints 2 and 3. To achieve this clear all waypoint designations by moving the cursor into the active main window and clicking **Esc**.
13. Move cursor to waypoint 2 and click left mouse button, waypoint will be circled with an ID number. Select **Delete Select Point(s)** from the Edit pull down menu, this will delete waypoint 2.
14. Repeat Step 14 to remove waypoint 3.

Re Route the Route/Payload Plan

15. Use left mouse button to select waypoint 1, the launch waypoint
16. Use Shift, left mouse button to select next waypoint on route. Dotted line will indicate the segment that needs to be re routed.
17. To route the Route/Payload Plan select Route from the Router pull down menu. Click **OK** in all display windows to run the router.

Finalize Vertical Route.

18. Select **FVR** from Router pull down menu, click **OK** in response to the next two dialogue boxes.
19. Retask the AV by repeating step 9 to upload the modified Route/Payload Plan.
20. Verify that the modified Route/Payload Plan is flown.
21. Verify that TCS can transfer data to Route/Payload Planner via the antenna with steps 15 and 16. [SRS0071-1]
22. To obtain active Route/Payload plan status from the AV. Select the route and the waypoint to which to attach the downloaded data, using the left mouse button.
23. Then select **Download Status from UAV** from the Tools pull down menu. Alternatively click on the **Download Status** hot key. This transfers TCS data to the Route/Payload Planner , AV data [SRS0072-1] and AV fuel data. [SRS0073-1]
24. Verify that Route/Payload Planner data is transferred to the ISD, check AVSI variable data on ISD for verification.

2.16 Endurance

The purpose of this test is to ensure that the TCS computer program is stable for a fixed duration of time. During the execution of the Endurance test procedure, operator action will not be scripted. Operator freeplay will be performed for most of the test procedure execution. The TCS Graphical User Interface (GUI) will be examined by a checklist of actions to be performed. The required DII/COE functionality integration will be examined during the endurance testing. The computer CPU and memory will be checked on a periodic basis to be used in an assessment of stability.

Requirements: SRS0021, SRS0022, SRS023, SRS0050, SRS0067, SRS0068, SRS0079, SRS0082, SRS0083, SRS0084, SRS0085, SRS0086, SRS0087, SRS0088, SRS0089, SRS0090, SRS0091, SRS0113, SRS0114, SRS0117, SRS0121, SRS0146, SRS0256, SRS0257

Steps:

1. Perform System Setup Procedure.
2. Verify there is an operator option to enter the current time selectable to Greenwich Mean Time (GMT) [SRS0114-2].
3. Verify there is an operator option to enter the current time selectable to local time [SRS0114-3].
4. Verify the display of the Charts map. If map is displayed exit the program. Start map by Clicking **Chart**, then **System Chart**. Map is displayed in a north upward orientation [SRS021-1].
5. Verify map functionality including Zoom, In, Out, Pan, Center, Redraw and Change Coordinates. To change coordinates click on the coordinate display then redraw. Grid lines will change to the selected coordinate system [SRS022-1].
6. Display the map; exit the Chart map display. The map is no longer displayed [SRS067-1].
7. Restart the map by selecting **Chart**, then **System Chart**.

Pan AV icon off/on the map.

8. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll until the AV is off the Map Display.
9. Verify the AV icon is no longer displayed on the Map and AV position and text is unchanged [SRS023-2].
10. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll until the AV is back on the Map Display
11. Verify the AV icon is displayed on the Map and AV position and text is unchanged [SRS023-3].

Pan payload footprint & center FOV off/on the map.

12. With the map displayed, click on the **PAN** button and move the hand the direction of the desired scroll until the payload footprint and the center field of view are off the Map Display.
13. Verify the payload footprint and center field of view are no longer displayed on the Map, and that AV position and text is unchanged [SRS068-2].

14. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll to pan the payload footprint, and the center field of view back on the Map Display.
15. Verify the payload footprint, and FOV are displayed on the Map and AV position and text is unchanged [SRS068-3].

Pan GDT off/on the map.

16. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll until the GDT is off the Map Display.
17. Verify the GDT is no longer displayed on the Map, and AV position and text is unchanged [SRS079-2].
18. With the map displayed, click on the **PAN** button and move the hand icon in the direction of the desired scroll until the GDT is on the Map Display.
19. Verify the GDT is back on the Map, and that AV position and text is unchanged [SRS079-3].

System resources check.

20. ****The computer CPU and memory will be checked on a periodic basis to be used in an assessment of stability. (disk space, CPU loading) Command: xload, xps – HP computer.

Stress testing.

21. ****Also during execution, interfaces will be stressed with the available simulators' functionality (message frequencies, operator actions, NITF capture).

GUI Check.

22. Verify the TCS graphical user interfaces are in a windowing environment via the following GUI checklist [SRS050-1].

GUI Check list:

TCS windows to be tested.

- 1) Map Display
 - a) Zoom, In, Out, Pan, Center, and Redraw
 - b) Change coordinates by clicking on coordinates then redraw. Grid lines will change
- 2) Video Display
- 3) RECEXREP Entry
- 4) NITF window
- 5) Datalink Setup
- 6) Datalink Command
- 7) Datalink Status
- 8) TDBM
- 9) Tac Msg
- 10) AV Preferences
- 11) AV Status

Items to test for each window.

- 1) Will the window open, move, maximize, minimize, resize, close?
- 2) Do the pointing devices and keyboard data entry work for the window?
- 3) Do the pull-down menu and sub-menu options work as expected?
- 4) Do the icons work as expected?
- 5) Do the lists, checks, select boxes or buttons work?
- 6) Do scroll bars work?
- 7) Can the window be partly or completely hidden without affecting its operation?
- 8) Can the window under test be exited or switch to the parent operating system window and then return without disruption?
- 9) Is the window's "look and feel" consistent with the TCS HCI Requirements Document?

Verify the ability for the user to set windows as desired [SRS0113-1].

23. Select the **Video 1** output from the TCS main window to open Video window 1. Verify video output window 1 is open.
24. Select the **Video 2** output from the TCS main window to open Video window 2. Verify video output window 2 is open.
25. Arrange video windows into a desired pattern.
26. Close video window 1.
27. Open video window 1 and verify that it appears in the location it was when it was closed. Note: if parts of the window are off the screen, upon reopening the output window, it will be repositioned so as to be fully on the screen.
28. Close video window 2.
29. Open video window 2 and verify that it appears in the location it was when it was closed. Note: if parts of the window are off the screen, upon reopening the output window, it will be repositioned so as to be fully on the screen.
30. Verify the user has the ability to arrange windows as desired (TCS, mission planner, TDBM, Tac Msg, etc.)

DII/COE Functionality:

Verify the ability to load a map from a CD. Refer to Map loading procedures. Note: DII/COE does not support this functionality for HP.

31. Insert map CD in drive.
32. Select **Chart**, then **Maploader** from the DII/COE pulldown menu.
33. Click on the first line (the CD entry). Select **Prepare for drawing**.
34. Select **Yes** in response to the "Load Globally?" prompt.
35. At the Map Process window Select **Map**, then **Overview**.
36. The map title is displayed. Select **Process** to begin copying the CD. Note: This process takes 15-30 minutes and is a one time operation for each CD.
37. Select **Map Options, Map Manager**. Select Map entry then **OK** to load the map.

38. Select **OUT** a few times for a better overall view of the map.
39. Use **IN**, and **Center** to position the map to the desired area.
40. Select **Save** and enter the map name [SRS0117-1]
41. Select **Map Options, Map Manager**.
42. Double click on the map you just saved, and select **OK**. Verify map loaded matches the map saved.
43. Select **Chart, Unmount CD** from the DII/COE menu to unload the CD.
44. Load map.

Printer interface:

45. Turn the printer off. Verify TCS can determine that the printer is offline. [SRS0146-1]
46. Turn the printer on. Verify TCS can determine that the printer is online. [SRS0146-2]
47. Ensure printer is online. Verify print capability. [SRS0146-3]
48. Use the DII/COE functionality. (Pan, Zoom, in/out of the map, NITF image viewing).
49. Moving windows around the TCS-HS screen is left to the discretion of the TCS-HS operator.
50. Zooming in on specific locations on the map is left to the discretion of the TCS-HS operator.

Examine the following functionality. Note: NITFs can not be viewed on a HP system.

51. Video display, creating and viewing of a NITF digital image, transmission of NITF messages using FTP and NFS, creating and flying of a mission plan, capturing of target data and sending of all of the TACCOM messages, SAR interface processing.

Display the TCS text associated with the NITF_MSG.

52. Ensure a video window is open and video is displayed.
53. Select **Capture** to capture a video frame.
54. Start the NITF editor:

cd /h/NITFS/bin

NITFSnitfedit

55. Select **UNPACK**. Select the NITF file.
56. Select Display Overview. Verify NITF header data is displayed [SRS0082-1].
57. Select Close. Verify NITF header data is no longer displayed. [SRS0083-1].
58. Select **Text**. Click on the first entry then select **EDIT**.

59. Verify the associated included telemetry is displayed [SRS0084-1].
60. Select Close. Verify the removal of the associated included telemetry display [SRS0085-1].
61. Select Text. Select New. Enter some text.
62. Select Save.
63. Redisplay the text saved by selecting Text then selecting the new text. Verify the operator entered text is displayed [SRS0084-2].
64. Select Close. Verify the removal of the operator enter text display [SRS0085-2].
65. Verify upon operator command, TCS shall display [SRS0086-1] the overlay symbols associated with the NITF_MSG.
66. Verify upon operator command, TCS shall remove from display [SRS0087-1] the overlay symbols associated with the NITF_MSG.
67. Verify upon operator command, TCS shall display [SRS0088-1] the overlay labels associated with the NITF_MSG.
68. Verify upon operator command, TCS shall display remove from display [SRS0089-1] the overlay labels associated with the NITF_MSG.
69. Verify upon operator command, TCS shall display [SRS0090-1] the data extensions associated with the NITF_MSG.
70. Verify upon operator command, TCS shall remove from display [SRS0091-1] the data extensions associated with the NITF_MSG.

Mission Planner

71. The specific objective of this mission planning stress test is to verify that each time a new build is delivered by Configuration Management (CM) for the NRTP software portion of the TCS-HS, Plan Manager will operate as required by all of the specific individual requirements in the SRS, and not present any unexpected behavior to the operator.
72. There is not one correct way to run this test. The operator has full control of the "script". It is imperative that any unexpected results are recorded to include how the unexpected results were obtained.
73. Enter Mission Planner and begin by creating a mission plan. Exhaust all of the waypoint manipulation modes available (L0 Routing, Flight Simulation, Finalize Vertical Route) to the operator by choosing all of them and using all of them for this first mission plan that is being created.
74. Use Save and Save As functions during creating of the mission plans.
75. Upload a mission plan to DCM and begin to fly this uploaded mission plan. While the uploaded mission plan is flying, modify the mission plan and retask the DCM.
76. Continue to use all of the windows, pulldown menus and buttons available to the operator within the other functionality.
77. TCS shall provide the capability for the operator to load additional mapping data. [SRS0117-1]

The additional mapping data will include, but not be limited to, Digital Terrain and Elevation Data (DTED), Digital Feature Analysis Data (DFAD), and Equal ARC Digitized Raster Graphics (ADRG), as provided by the DII Joint Mapping Tool Kit (JMTK) services.

78. TCS shall provide the capability for the operator to select the datum (as provided by the DII JMTK services) to be used for the current mission. [SRS0119] All datums in DMA TR8350.2 Table 7.5 should be supported. Default will be WGS84.

Coordinate Conversion.

79. Verify TCS provides the TCS operator a window with the following selectable spheroids for coordinate conversion:

Airy *

Australians National

Bessel

Clarke 1866

Clarke 1880

Everest

International 1909

Modified Airy *

Modified Everest *

WGS 1972 [SRS0121-4]

Spheroids marked with an asterisk are not supported for coordinate transformation from UTM to MGRS.

80. Verify Lat/Long, UTM and MGRS conversions are possible (as provided by the DII JMTK services) [SRS011-1, SRS0121-2, SRS0121-3].

Lat/Long	UTM	MGRS

Browse/View captured NITF images:

81. Select Intel, then Image Composition Tool from the DII/COE pulldown menu. Load the file to view. Left-click on **File**, and then left-click on **Load (File System)**. The **File Selection** window appears.
82. Select the directory. Move from **/h/data/local/NITFS/tmp/** to **/h/TCS/data/video_frames/** and then select **OK**.
83. Using the scroll bar, browse [SRS0256-1] through the stored NITF messages and select [SRS0257-1] a NITF image for further processing. Select it, and **OK**. The Captured image will appear on **Image Composition** window.

Define TDBM tracks.

84. From the TCS Main window select **Comms**, then **TDBM**. At the TDBM window enter coordinates for the track. Enter country code, echelon, Org type, Short name, Long name. Select apply.
85. Verify a track appears on the map with the short name given.

86. Double click on the track. Verify the tactical database manager window with the tracks parameters is displayed [SRS0258].

TCS Console:

87. TCS shall provide the capability for the operator to set up the TCS consoles as desired for the mission [SRS0113-1] to be incorporated as part of the normal startup procedures. For example, open two payload windows on the payload console.

APPENDIX A SRS REQUIREMENT MAPPING THE TEST PROCEDURES

This table maps the TCS SRS requirement to the test procedure that will ensure that the requirement is implemented in the software design correctly and completely.

REQ NUM	PROCEDURE	COMMENT
SRS0001		Infer by other requirements functioning
SRS0002	Default State Data Procedure	
SRS0003		Require a file to be change or moved There exist no code to support this requirement STR SWINT0017
SRS0004	Shutdown Processing Procedure	
SRS0005	SAR Processing Procedure	
SRS0006	Telemetry Procedure	
SRS0008	Video Processing Procedure	
SRS0009	Video Processing Procedure	
SRS0012	Video Processing Procedure	
SRS0013	Video Processing Procedure	
SRS0014	Video Processing Procedure	
SRS0016	Video Processing Procedure	This requirement will be tested with a RS-170 NTSC monitor (interface is the same as C4I systems) TCS does not have hardware for creating close caption
SRS0018	Video Processing Procedure	This requirement will be tested with a RS-170 NTSC monitor (interface is the same as C4I systems) TCS does not have hardware for creating close caption
SRS0020	Video Processing Procedure	This requirement will be tested with a RS-170 NTSC monitor (interface is the same as C4I systems) TCS does not have hardware for creating close caption
SRS0021	Endurance Procedure	
SRS0022	Endurance Procedure	
SRS0023	System Setup Procedure	
SRS0024	System Setup Procedure	
SRS0025	NITF Message Procedure	
SRS0026	NITF Message Procedure	
SRS0027	NITF Message Procedure	
SRS0028	NITF Message Procedure	
SRS0029	NITF Message Procedure	
SRS0031		JDISS IDD does not specify the method for NITF Transfer Lab environment does not have a connection to JDISS
SRS0033	NITF Message Procedure	
SRS0034	C4I Tactical Messages	
SRS0036	C4I Tactical Messages	
SRS0037	C4I Tactical Messages	

REQ NUM	PROCEDURE	COMMENT
SRS0039	C4I Tactical Messages	
SRS0041		Only RECCEXREP
SRS0044		Only RECCEXREP
SRS0045		Only RECCEXREP
SRS0048		This is a software design requirement, Inferred by Test Cases
SRS0049		This is a software design requirement, Inferred by Test Cases
SRS0050	Endurance Procedure	
SRS0052		Only RECCEXREP
SRS0054		Only RECCEXREP
SRS0055		Lab environment does not have a connection to ASAS
SRS0057	SAR Processing Procedure	
SRS0058	SAR Processing Procedure	
SRS0059	C4I Tactical Messages	
SRS0061	Telemetry Procedure	
SRS0062	Video Processing Procedure	
SRS0063	Video Processing Procedure	
SRS0064	Video Processing Procedure	
SRS0064	Video Processing Procedure	There exist no overlay capability
SRS0065	Video Processing Procedure	There exist no overlay capability
SRS0066	Video Processing Procedure	There exist no overlay capability
SRS0067	Endurance Procedure	
SRS0068	Endurance Procedure	
SRS0068	Video Processing Procedure	
SRS0069	Antenna Processing Procedure	
SRS0070	Antenna Processing Procedure	
SRS0071	RPP Transmission Procedure	
SRS0072	RPP Transmission Procedure	
SRS0073	RPP Transmission Procedure	
SRS0074	RPP Transmission Procedure	
SRS0075	RPP Transmission Procedure	
SRS0076	NITF Message Procedure	
SRS0077	NITF Message Procedure	
SRS0078	NITF Message Procedure	
SRS0079	Antenna Processing Procedure	
SRS0080	NITF Message Procedure	
SRS0081	NITF Message Procedure	
SRS0082	Endurance Procedure	
SRS0083	Endurance Procedure	
SRS0084	Endurance Procedure	
SRS0085	Endurance Procedure	
SRS0086	Endurance Procedure	
SRS0087	Endurance Procedure	
SRS0088	Endurance Procedure	
SRS0089	Endurance Procedure	
SRS0090	Endurance Procedure	
SRS0091	Endurance Procedure	
SRS0092		Lab environment does not have a connection to JMCIS
SRS0093		The ETRAC IDD does not specify a

REQ NUM	PROCEDURE	COMMENT
		NITF transfer method. Lab environment does not have a connection to ETRAC
SRS0094		Lab environment does not have a connection to JSTARS
SRS0095		Software does not exist
SRS0096	C4I Tactical Messages	
SRS0097	C4I Tactical Messages	
SRS0098	C4I Tactical Messages	
SRS0101	C4I Tactical Messages	
SRS0101	Default State Data Procedure	
SRS0102	C4I Tactical Messages	
SRS0103	System Setup Procedure	
SRS0104	Default State Data Procedure	
SRS0111		Not supported in the build STR #
SRS0113	Endurance Procedure	
SRS0114	Default State Data Procedure	
SRS0114	Endurance Procedure	
SRS0117	Endurance Procedure	
SRS0119		Not supported in the build STR #
SRS0121	Endurance Procedure	
SRS0127	Payload Control Procedure	
SRS0127	RPP Transmission Procedure	
SRS0128		Not supported in the build STR #
SRS0144		Not supported in the build STR #
SRS0145		Not supported in the build STR #
SRS0146	Endurance Procedure	
SRS0205	Antenna Procedure	
SRS0206	Antenna Procedure	
SRS0207	Antenna Procedure	
SRS0208	Antenna Procedure	
SRS0209	Antenna Procedure	
SRS0215	Antenna Procedure	
SRS0221		Not supported in the build STR
SRS0222	Payload Control Procedure	
SRS0223	Payload Control Procedure	
SRS0224	Payload Control Procedure	
SRS0225	Payload Control Procedure	
SRS0226	Payload Control Procedure	
SRS0230		Not supported in the build STR #
SRS0231		Not supported in the build STR #
SRS0234		Not supported in the build STR #
SRS0237		Not supported in the build STR #
SRS0238	Payload Control Procedure	
SRS0246		Not supported in the build STR #
SRS0247		Not supported in the build STR # THIS A HARDWARE REQUIREMENT
SRS0256	Endurance Procedure	
SRS0257	Endurance Procedure	
SRS0258	C4I Tactical Messages	This is the resending of a track that has already been sent